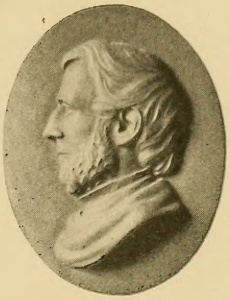
TORREYA

MONTHLY JOURNAL OF BOTANICAL NOTES AND NEWS



JOHN TORREY, 1796–1873

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

MARSHALL AVERY HOWE

Volume II.

NEW YORK

1902

PRESS OF
THE NEW ERA PRINTING COMPANY,
LANCASTER, PA.

THE TORREY BOTANICAL CLUB

OFFICERS FOR 1902.

President,
HON. ADDISON BROWN, LL.D.

Vice-Presidents,
T. F. ALLEN, M.D. HENRY H. RUSBY, M.D.

Recording Secretary,
EDWARD S. BURGESS, PH.D.,
Normal College, New York City

Corresponding Secretary,
JOHN K. SMALL, PH.D.,
Botanical Garden, Bronx Park, New York City.

Editor,
L. M. UNDERWOOD, PH.D.
Columbia University.

Treasurer,
FRANCIS E. LLOYD, A.M.
Columbia University.

Associate Editors.

NATHANIEL L. BRITTON, PH.D. FRANCIS E. LLOYD, A.M.
CARLTON C. CURTIS, PH.D. DANIEL T. MACDOUGAL, PH.D.
MARSHALL A. HOWE, PH.D. HERBERT M RICHARDS, S.D.
ANNA MURRAY VAIL.

Meetings the second Tuesday and last Wednesday of each month alternately at the College of Pharmacy and the New York Botanical Garden.

PUBLICATIONS. Bulletin. Monthly, established 1870. Price $3.00 per year; single numbers 30 cents. Of former volumes only 1–6, 13, and 19–27 can be supplied entire. Partial numbers only of vols. 7–18 are available, but the completion of sets will be undertaken. All correspondence to be directed to the Editor or Treasurer at Columbia University, New York City.

Memoirs. A series of technical papers published at irregular intervals established 1889. Price $3.00 per volume.

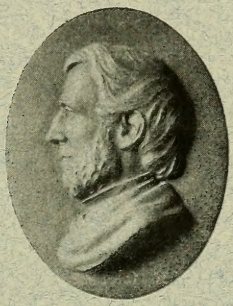
Torreya. Monthly, established 1901. Price $1.00 per year. Address the Editor of Torreya, New York Botanical Garden, Bronx Park, New York city.

Vol. 2 January, 1902 No. 1

TORREYA

A Monthly Journal of Botanical Notes and News

EDITED FOR
THE TORREY BOTANICAL CLUB
BY
MARSHALL AVERY HOWE



JOHN TORREY, 1796–1873

CONTENTS

Conservation of Energy in Mycological Clubs: Lucien M. Underwood 1
The Field Study of Mushrooms: F. S. Earle 2
The "Tendrils" of the Kentucky Coffee-tree: Byron D. Halsted 5
A new Timber for Railroad Ties: H. H. Rusby 6
Some Notes on the Dwarf Mistletoe: Clifton D. Howe 8
Shorter Notes
A Georgia Rhododendron: J. K. Small 9
A new Mouriria from Porto Rico: N. L. Britton 10
Proceedings of the Club: Edward S. Burgess 10
News Items 13

Published for the Club
At North Queen Street, Lancaster, Pa.
by The New Era Printing Company

THE TORREY BOTANICAL CLUB

OFFICERS FOR 1901

President,
HON. ADDISON BROWN.

Vice-Presidents,
T. F. ALLEN, M.D. HENRY H. RUSBY, M.D.

Recording Secretary,
EDWARD S. BURGESS, PH.D.
Normal College, New York City.

Corresponding Secretary,
JOHN K. SMALL, PH.D.
Botanical Garden, Bronx Park, New York City.

Editor,
L. M. UNDERWOOD, PH.D.
Columbia University.

Treasurer,
H. B. FERGUSON, PHAR.D.
College of Pharmacy, 115 West 68th St., New York City.

Associate Editors.

NATHANIEL L. BRITTON, PH.D. FRANCIS E. LLOYD, A.M.
CARLTON C. CURTIS, PH.D. DANIEL T. MACDOUGAL, PH.D.
MARSHALL A. HOWE, PH.D. HERBERT M. RICHARDS, S.D.
ANNA MURRAY VAIL.

Meetings the second Tuesday and last Wednesday of each month alternately at the College of Pharmacy and the New York Botanical Garden.

PUBLICATIONS. Bulletin. Monthly, established 1870. Price $3.00 per year. Of former volumes, only 1–6 and 19–27 can be supplied entire, but the completion of sets will be undertaken. All correspondence relating to the **Bulletin** and **Memoirs** should be addressed to Professor L. M. Underwood, Columbia University, New York City.

Memoirs. A series of technical papers published at irregular intervals, established 1889. Price $3.00 per volume.

Torreya. Monthly, established 1901. Price $1.00 per year. Address the Editor of Torreya, New York Botanical Garden, Bronx Park, New York City.

Vol. 2 No. 1

TORREYA

January, 1902

CONSERVATION OF ENERGY IN MYCOLOGICAL CLUBS

By Lucien M. Underwood

When the mycological club idea first swept over the country it was thought by some of the less sanguine that like many other fads the interest would soon die out, but the amount of vitality possessed by some of the clubs shows an increasing instead of a decreasing interest. And in some of the clubs certain of the members have done some most interesting work; not only have they made themselves familiar with numerous species in the field but they have also been led in some cases to make permanent records of the characters of these perishable plants. The amount of energy that is put forward in a summer by any one of these clubs is astounding when considered in the aggregate and if only conserved and turned toward the accomplishment of a single point or a few objective points would soon place us in possession of most valuable information relative to our fungus-flora. One of the most needed works is a descriptive manual small enough to be taken into the field for study and complete enough to contain all the known American species of the plants it attempts to describe and provided with usable keys or synopses that will surely lead rather than mislead the beginner. Of beginners' books we already have a sufficiency. To make possible such a work as suggested will involve time and patient work, but the small army of mycological club members could add very material contributions to such a work and hasten its preparation by following the lead of some suggestions. In order to accomplish this as any other task it will require a deal of patient labor on the part of collectors and a good deal of what has been called "dead work."

[The exact date of publication of each issue of Torreya is given in the succeeding number. Vol. 1, No. 12, comprising pages 137–156, was issued December 28, 1901.]

Our present knowledge of the higher flora has been brought to its present condition by the contributions of material from hundreds of individuals all over the country. A knowledge of our mycological flora must be brought about in the same way and none are in better condition to help in this matter than these clubs whose primary object is the study of these interesting plants. In order to direct the effort of these clubs so as not to waste energy I would suggest for the present year concentration of effort on certain definite groups of genera.

I would suggest some such series as *Boletus*, *Boletinus*, *Coprinus*, *Lactarius*, *Russula*, *Hygrophorus*, *Lentinus*, and *Marasmius*. Other generic groups need not be neglected but the principal effort might be directed to the above. They are: (1) Easily recognized genera, and (2) contain for the most part edible species, and (3) in most cases are in crying need of a good descriptive synopsis of species. The form of field notes suggested in the next article will take time and patience but will place us in possession of field data that could be obtained only by field workers.

Could the efforts of the clubs or of isolated individuals all over the country be directed toward these genera for one or two seasons and the results with the carefully preserved material be transmitted to a common center for collation and comparison it would serve as the basis of a fairly complete knowledge of the genera in question, their habits, variation, season, and distribution. Such combined effort would count in a single direction and results now scattered and often wasted would be saved and utilized for the help of others in the future.

Columbia University, January 1, 1902.

THE FIELD STUDY OF MUSHROOMS

By F. S. Earle

In no group of plants is careful study in the field so necessary as with the mushrooms, since their soft fleshy texture makes it impossible to prepare them for the herbarium in any way that will fully retain the characters of the fresh plant. In nearly all other groups of plants material hastily gathered and prepared in the

field can be studied at leisure in the herbarium almost as well as if it were in a fresh state. A dried mushroom, unless accompanied by full and carefully made field notes, is usually almost or quite worthless for purposes of identification or study. It is this fact more than any other that accounts for our present scanty and unsatisfactory knowledge of the mushroom flora of North America. It must not be inferred from the above that the dried specimens are useless, and can therefore be dispensed with. On the contrary, they should be prepared and preserved with great care, since they serve to interpret the descriptions, and, while not preserving fully the characters of the fresh plant, they do preserve some of them, and often besides develop quite good ones of their own. They should be dried quickly by fire-heat in a wire rack placed over a stove or lamp. They should then be stored in pasteboard boxes, and should not be moistened and pressed flat, as is sometimes advised. Before drying the plants, each lot should be carefully studied, and a full description drawn up of all the points likely to be useful in determining the species. This is time-consuming work, but upon its faithful performance the entire value of the collection will depend. In order to save time and to systematize the work, I have devised the following description-blank :*

Name	**Veil**
Habitat	**Annulus**
Habit	**Stipe**
Pileus	size
size	shape
shape	surface
color	color
surface	substance
margin	**Volva**
Lamellae	Flesh
attachment	color
number	changes
shape	taste
color	odor
spores	

* This is here printed in two columns merely to economize space; in Professor Earle's blank the printing stands in a single column.—Ed.

When printed on slips 4½ x 8½ inches, and about fifty of them blocked together on a stiff pasteboard back, it makes a convenient pad to write on and to carry in the pocket. This blank has proved to be of great use not only in saving time but in unifying the descriptions and making them fully comparable one with another. Without some such guide and reminder one will surely omit, in writing a description, some of the above points, making a comparison of the descriptions very unsatisfactory. Even our best and most careful mycologists when writing descriptions for publication have failed in this uniformity as any one will testify who has attempted to construct keys to the species of the larger genera.

If the numerous people who are now interested in collecting the fleshy fungi would all adopt some such simple plan for unifying and preserving the results of their observations on these interesting plants there is no reason why our knowledge of them might not soon be as complete as it is of the flowering plants. The plan of using description-blanks for field study is not particularly new. Various other forms are in use by different workers. The exact form used is not important. The main thing is to adopt some simple plan that will enable the observer to record in each case all the characters that will be of use in the determination of the plant and the comparison of one species with another. Carefully dried specimens and faithfully drawn descriptions of the fresh plant are equally necessary for the proper representation of these plants in the herbarium. To be fully satisfactory these should be supplemented by photographs and by water-color sketches. It really excites the imagination to think of a large collection of these plants fully represented in each of these ways. For some purposes plants preserved wet, either in alcohol or formalin, would also be useful, but no liquid preservative has been found that is fully satisfactory and such a collection without notes would be no more useful than the dried plants alone.

New York Botanical Garden, January 1, 1902.

THE "TENDRILS" OF THE KENTUCKY COFFEE-TREE

By Byron D. Halsted

Seeing the paper by Dr. MacDougal upon tendrils of *Entada scandens* leads me to bring to light the following note made some years ago.

Much to my surprise in examining some young leaves of the *Gymnocladus dioica* (L.), "tendrils" were found present in each case. The leaves of this leguminous plant are pinnately decompound, the sets of leaflets being in pairs although not usually opposite upon the common petiole. Between and above the uppermost pair there is a slender projection turned more or less to one side and an inch or so in length. There are similar appendages at the ends of the lateral pinnae.

In position and structure these appendages are tendril-like and as the *Gymnocladus* is a member of a family in which tendrils are not exceptional their presence here is not so surprising as might seem at first thought.

There is no apparent advantage in this structure to the plants now producing them and it becomes of only phylogenetic importance. It would seem, therefore, that at some time the ancestors of the *Gymnocladus* were truly tendril-bearing and it is to be inferred that they used them for clinging to supports. In becoming trees the members of this species lost the need of the tendril and the structure has become reduced to an abortive thread that seems useless and is evanescent. When a leaf has attained only a fraction of its full growth the vestige of the organ for clinging has disappeared.

It seems absurd that a stately tree should have at any time anything that suggests clinging to an object of support; but viewed in the light of a vanishing appendage it is highly interesting and instructive.

The same thing is true of the Honey Locust (*Gleditsia triacanthos* L.) and perhaps also of other trees of the Leguminosae.

The picture herewith sent is a sun print of portions of young leaves in which the "tendrils" may be seen.

Doctor MacDougal suggests that these prolongations of the leaf-axes may possibly be considered as degenerate terminal leaf-

lets. It is not easy to decide what they are historically or that they are not useful now to the plants that bear them.

RUTGERS COLLEGE, November 27, 1901.

A NEW TIMBER FOR RAILROAD TIES

By H. H. RUSBY

It is reported that the Pennsylvania Railroad Company has arranged for a great innovation, in the use of tropical timbers for

railroad ties. The wood which has been selected for this purpose is the "Mora" of Venezuela and the adjacent regions, not that of Central America. The botanical identity of this Venezuelan Mora is not positive. I have collected it in the lower Orinoco region, but not in a condition for specific identification. It is certainly a member of the Rosaceae and probably in the genus *Parinarium*. A fine large trunk-section exists in the Economic Museum of the New York Botanical Garden. It grows as a large forest tree, sometimes very large indeed, being four or five feet in diameter. Like most tropical trees, it grows scattering rather than gregarious. The wood is extremely hard and heavy and the bark thin and very smooth, considering the size of the tree, there being very little fissuring or bork-formation. The outer color of the bark is of a medium to dark gray, mottled with lighter patches. The wood cuts rather readily when fresh but becomes exceedingly difficult to work after it is seasoned. In the latter state it takes a somewhat purplish tinge, to which its name "Mora" is due. It is not only hard, but tough and very durable. It is due to the last-named property that its use has been decided upon. It is said to endure for a period of fifty years. It is to be remembered, however, that this durability record relates to a tropical climate. It might be assumed that it could resist decay even longer in a temperate region where certain influences are not so active as in the tropics. Upon the other hand it is to be remembered that wood in the tropics is not subject to the sudden and severe changes of temperature which must be undergone by railroad ties in this country, and the effects of which upon this wood are quite unknown. The result of this trial will prove of the greatest interest. If successful, there is no reason why numerous other hard tropical woods possessing the same properties, a number of them growing in the same region with this Mora, cannot be similarly utilized. It is stated that the cost of these ties will be about $1.50 each, which is just about double that of the ties now in use, but it seems to the writer very doubtful if the expense of securing them will not be considerably greater than this estimate.

New York College of Pharmacy.

SOME NOTES ON THE DWARF MISTLETOE

By Clifton D. Howe

Until recently the known distribution of the dwarf mistletoe [*Razoumofskya pusilla* (Peck) Kuntze] was confined to a few stations, these being in New York, New Hampshire and Pennsylvania. These stations doubtless became known through the interest immediately stimulated by the discovery of the plant at Warrensburg, New York, in 1871, and by the subsequent description of it by Peck in 1873.* In 1898 and 1899, the range of this interesting parasite was extended by its discovery in Maine, Massachusetts and Vermont. The most northern station was Fort Kent, Aroostook County, Maine. An account of these discoveries with descriptions and notes upon its habitat was published in *Rhodora* for January, 1900.

Last summer, as a member of the New York Botanical Garden Expedition to Nova Scotia and Newfoundland, the writer found *Razoumofskya pusilla* at Pictou, Nova Scotia. The host was a small black spruce (*Picea Mariana* B.S.P.), growing on the edge of a pond in the woods about one mile from the sea. A month later, August 10, 1901, he discovered another station at Bay of Islands on the western coast of Newfoundland. The trees affected were in a sphagnous swamp on the top of a rocky hill abruptly rising about 400 feet from the bay. As in the former case, the host plant was the black spruce, but the parasite was much more abundant. Twenty spruces bearing conspicuous "witches' brooms" were counted on an area of less than a half acre. The trees were small, stunted and sickly in appearance. Some of them, apparently unable to endure the parasites, combined with an inhospitable climate, had succumbed before attaining their normal size.

The locality is about thirty miles from the open ocean, being at the head of the Bay of Islands near the mouth of the Humber River. Thus the plant is to some extent protected from the extreme exposure of the coast, while at the same time it has the environment of abundant moisture which seems most favorable

* Peck, C. H. Twenty-fifth Ann. Rep. on N. Y. State Mus. Nat. Hist. 69. 1873.

to its development. An unsuccessful search for *Razoumofskya* was made at other places in Newfoundland.

The station at the Bay of Islands is very near the 49th parallel of latitude. As *Razoumofskya pusilla* is one of the outlying representatives of a chiefly southern and tropical family, its occurrence so far north seems worthy of record.

Department of Botany, University of Chicago.

SHORTER NOTES

A Georgia Rhododendron.—For nearly three quarters of a century a single specimen of a *Rhododendron* related to the Alleghenian *R. punctatum* has been preserved in the Columbia University herbarium. This specimen was collected in middle Georgia by Dr. Boykin, and nothing similar to it came to my notice until Mr. A. Cuthbert sent me specimens which he collected in the spring of 1901, from shrubs growing along the Savannah River, near Augusta, Georgia.

The most conspicuous external character of this species is the relatively long corolla-tube which in this case is longer than the lobes. In the case of *R. punctatum* the lobes of the corolla are longer than the tube. A striking feature of the plant is the corolla-limb with its broad crisped lobes, the upper lobe being copiously yellow-blotched. The corolla-lobes of *R. punctatum* are of an ovate type and perfectly flat along the edges. I shall call this species after Mr. Cuthbert and characterize it as follows:

Rhododendron Cuthbertii

A slender straggling shrub 2–3.5 m. tall, with resinous-scurfy foliage. Leaves mostly at the ends of the branches; blades leathery, elliptic, 3–13 cm. long, acute at both ends, or acuminate at the apex, more or less revolute, somewhat reticulated above, scurfy beneath; petioles 1–1.5 cm. long, more scurfy than the blades, rather stout: flower-clusters quite dense: pedicels 1–1.5 cm. long, clothed with pale scales: sepals ovate, 2 mm. long: corolla mainly of a clear rose tint with some yellow near the base; tube funnelform, rather abruptly expanded near the middle, fully 1.5 cm. long; limb 3–3.5 cm. broad, the lobes suborbicular or orbicular-reniform, truncate or subcordate at the base, crisped, the upper one copiously blotched: capsule 8–12 mm. long.

On river banks, middle and eastern Georgia. Spring.

The species grows abundantly on steep gneiss slopes along the Savannah River about seven miles above Augusta. Type in the herbarium of the New York Botanical Garden. J. K. Small.

A new Mouriria from Porto Rico.—*Mouriria* Aubl. is a genus of Melastomaceae including about forty species, natives of continental tropical America and the West Indies. Of these *M. Domingensis* (Tussac) Spach, a tree with ovate pinnately-veined leaves is apparently frequent on Porto Rico, and five species are recorded from Cuba. The plant here noticed was first collected by P. Sintenis near Hatillo, and specimens with foliage only were distributed from the Berlin Herbarium annotated by Professor Urban as related to *M. spathulata* Griseb., a Cuban species.

M. spathulata is, however, a species with distinctly pinnately-veined leaves, and, as shown by Linden's no. 2147, is clearly different from the Porto Rico plant under consideration, which apparently finds its nearest known relative in *M. lanccolata* Griseb., also Cuban. The new species may be characterized as follows:

Mouriria Helleri.—A spreading shrub, 2–3 m. high, the slender branches light gray. Leaves oblong to oval, thick, bluish green, strongly 1-nerved, the few lateral veins very indistinct, obtuse at the apex, narrowed at the base, 2–3 cm. long, 1–1.7 cm. wide, the margins somewhat revolute; petioles about 1 mm. long: flowers solitary in the upper axils, few; pedicels 5–6 mm. long, 2-bracteolate at about the middle, the bractlets 1 mm. long, ovate, acute: berries orange-color, 1 cm. in diameter or more, fleshy, the persistent cup-shaped calyx with short broad acute lobes.

In sandy soil near a mangrove swamp, Cataño (Heller, no. 1372, in fruit, May 23, 1899; type); rocky places in the forest near Hatillo (Sintenis no. 6195, Dec. 2, 1877, foliage only).

N. L. Britton.

PROCEEDINGS OF THE CLUB

Tuesday, November 12, 1901

This meeting was held at the museum, Botanical Garden, Bronx Park, at 3:30 p. m., Professor L. M. Underwood in the chair; 20 persons present.

On report of the committee on nominations, the name of Professor Charles E. Bessey was removed from the list of corresponding to that of active members.

The Club voted that beginning with January 1st, the Club meet each second Tuesday of the month at the College of Pharmacy at 8 p. m., and on each last Wednesday at 3:30 p. m. at the Botanical Garden.

The first paper was by F. S. Earle, on "*Ascocorticium* in North America," correcting the current nomenclature as to this genus.

The second paper, by Dr. Britton, "Remarks on the Flora of St. Kitts, British West Indies," was a sketch of his recent observations there, with a copious series of mounted specimens and of fruits and other specimens in formalin. Scarcely any botanical work had been done on St. Kitts previous to the explorations by Dr. Britton and Mr. John F. Cowell last summer. In all they collected about 3,500 herbarium specimens, representing perhaps half of the flora. Several tree-ferns were brought which are now making good growth, and a considerable number of cacti which are already on exhibition in the succulent house.

Dr. Britton spoke in particular of the great interest attaching to that purely tropical flora, the only plant familiar from our Atlantic coast being the introduced horseweed, *Leptilon*. St. Kitts is a volcanic mass, formed of a rugged central mountain rising to about 4,000 feet, dissected by radiating gorges which reach to the sea, and wholly surrounded by a fringe of arable land on the shore. Sides of steep ravines 300 feet deep were often completely covered with a prodigious growth of tree-ferns; there were four or five species in the ravines and one or two others more in the denser forests; some reached a height of 50 feet; one species was chiefly prostrate. A good number of the filmy ferns were found and several Gleicheniaceae at high altitudes, where ferns constituted the chief flora. No *Equiseta* were found; among the lycopods, a few specimens of *Psilotum* on tree-trunks, some large and handsome species of *Selaginella*, and three of *Lycopodium*, of which one conspicuous species was known to the negroes as "staghorn." The grasses number 30 or more, the largest a

Gynerium known as wild cane or dumb cane. Guinea-grass, *Panicum maximum*, is the entire source of hay. Sedges were few, for there is little standing water (except a littoral salt marsh), only a little pond near a mountain summit at 3,500 feet, and a little lake in the bottom of the old crater of the volcano, Mt. Misery. A *Scleria* with saw-edged leaves is an obstacle on mountain-trails.

Aroids are very conspicuous, and in great quantity, but only about 8 species; two of *Anthurium*, climbing trees, two of *Philodendron*, one with perforated leaves; one *Dieffenbachia;* and a species known as elephant's ears, forming great masses, with leaves sometimes five feet long.

Only two palms were found, one, a *Bactris*, reaching thirty feet; two species of *Commelina;* three or four species of *Tillandsia;* a *Dioscorea* with a remarkable purple leaf, now growing in the propagating house; about sixteen orchids; and one gymnosperm, a *Podocarpus* abundant high up, and known as "wild rosemary tree." Among higher plants the pepper family, the Papilionaceae and allies, *Euphorbia* and *Melastoma* families are numerous. The Compositae are also numerously present, but chiefly as weeds; a handsome new purple-flowered *Eupatorium* was found on the top of Mt. Misery forming a shrub eight to ten feet high. The alligator-pear, *Persea gratissima*, is quite abundant. There are four species of *Ficus*, a wild cherry, a *Viola*, etc. An introduced raspberry occurred in a mountain pasture at 2,000 feet. Among the more peculiar plants were the *Cecropia*, with white under surfaces of leaves, *Marcgravia* climbing appressed to trees to the height of fifty feet, and *Hillia*, interesting from its large lustrous white flowers.

The results of Dr. Britton and Mr. Cowell's expedition bid fair to prove of high economic importance aside from their scientific value. The expedition owed much to the kind assistance of the planters, who detailed their negroes and horses for the service of the explorers. Without such aid it would have been difficult to penetrate the forest-belt, through which trails had first to be cut.

Further remarks were added by Dr. Underwood, regarding a dodder in tops of trees in Porto Rico; by Mr. Barnhart, on a

Utricularia among the specimens exhibited from St. Kitts; by Mr. F. S. Earle on the few fungi collected; and by Mrs. Britton on the other cryptogams, which numbered 81, and included a *Vittaria* prothallium.

EDWARD S. BURGESS,
Secretary.

NEWS ITEMS

Professor W. J. Spillman, formerly of the Washington Agricultural Experiment Station, has been appointed Agrostologist of the U. S. Department of Agriculture to succeed Professor F. Lamson-Scribner, who has resigned to become Chief of the Insular Bureau of Agriculture in the Philippines.

The third annual meeting of the Botanists of the Central States was held at the University of Chicago, December 31, 1901, and January 1 and 2, 1902, in connection with the meeting of the American Society of Naturalists. The program, as announced, included twenty-seven botanical papers.

The seventh annual winter meeting of the Vermont Botanical Club will be held at the University of Vermont, Burlington, January 24th and 25th. The annual address is to be delivered by Professor B. L. Robinson, of Harvard University, his subject being "Some recent Advances in the Classification of the Flowering Plants." A full and interesting program is promised.

A case of "duplication of contributions" comparable with that referred to by Dr. MacDougal in TORREYA for November last is an article on "The Nomenclature of Lachnanthes," by James Britten, F.L.S., in the *Journal of Botany* for January, 1902. In this correction of current nomenclature, Mr. Britten traverses practically the ground covered by Mr. Roland M. Harper in his notes on the "Synonymy of Burmannia and Gyrotheca," published in TORREYA for March, 1901, and reaches the same results.

At the Nineteenth Congress of the American Ornithologists' Union, which met in New York City November 11–15, 1901,

Dr. J. A. Allen, Curator of the Department of Mammalogy and Ornithology of the American Museum of Natural History, read a suggestive paper on "The present Outlook for Stability in Nomenclature." He referred to the gradual acceptance of the methods of the American ornithologists by foreign ornithologists and also by American workers in other branches of the biological sciences.

Longmans, Green and Company have in press an "Elementary Plant Physiology" by Dr. MacDougal, which is intended to replace the "Experimental Plant Physiology" by the same author published by H. Holt and Company in 1895. The first-named company has purchased all the rights of the older book and destroyed the plates, and the edition is entirely exhausted. The new text will present the subject in its simplest technical aspect, and will be uniform in method of treatment with the more advanced Practical Text-Book of Plant Physiology published in 1901.

Dr. Charles Mohr's "Plant Life of Alabama" has been soon followed by "The Flora of Tennessee" written by Augustin Gattinger, M.D., and published by the State of Tennessee through its Bureau of Agriculture. This work consists of an annotated list of the Pteridophytes and Spermatophytes of Tennessee, preceded by an account of the regional distribution of the plants of the State and by a preface containing much interesting autobiographical matter, the whole being followed by the "Philosophy of Botany," a historical sketch of the development of the science from the earliest times.

From the income of the Olivia and Caroline Phelps Stokes Fund for the Protection of Native Plants, the New York Botanical Garden has offered three prizes of $50, $30 and $20, each, for the best essays upon the preservation of wild plants, including shrubs, herbs and trees. Such essays must not exceed three thousand words in length, must be clearly written or type-written in triplicate, and are to be submitted to the Director-in-Chief not later than February 1, 1902. The successful essays are to be published first in the *Journal* of the Garden, separates being

printed for gratuitous distribution to all interested. Republication of the prize essays in other journals, magazines and newspapers is to be invited.

The Society for Plant Morphology and Physiology held its fifth annual meeting at Columbia University, on December 31, 1901, and January 1, 1902. The following papers and reports were presented: Artificial changes affecting the Vegetation of the Huron River, *Professor V. M. Spalding*, University of Michigan; A floating tropical botanical Laboratory (illustrated), *Dr. John W. Harshberger*, University of Pennsylvania; The Physiology of Sea-water, *Dr. Rodney H. True*, Department of Agriculture; On the Teaching of Plant Physiology to large elementary Classes, *Professor W. F. Ganong*, Smith College; Discussion upon the most profitable Relation of the American botanical Societies to one another, opened by *Dr. D. T. MacDougal*, New York Botanical Garden; Report of the Committee on the Botanisches Centralblatt, *Professor W. G. Farlow*, Harvard University, Chairman; On the Teaching of Vegetable Pathology, *Dr. Hermann von Schrenk*, Shaw School of Botany; A Disease of the American Ash, *Dr. Hermann von Schrenk;* The Destruction of Cell Walls by Bacteria, *Dr. Erwin F. Smith.*, Department of Agriculture; Observations on the Bacterial Rot of the Calla Lily, *Dr. C. O. Townsend*, Department of Agriculture; Germination of Basidiomycetous Spores, *Dr. Margaret C. Ferguson*, Wellesley College; Vegetative Reproduction in Leptolejeunea, *Professor A. W. Evans*, Yale University; Observations on Pterygophora, *Professor Conway MacMillan*, University of Minnesota; Notes on new species of Lichens collected by the Harriman Expedition, *Professor Clara E. Cummings*, Wellesley College; What is the Archesporium? *Professor F. E. Lloyd*, Columbia University; The Embryology and Germination of the Genus Peperomia, *Professor Duncan S. Johnson*, Johns Hopkins University; Report of the Committee on the Standard College Entrance Option in Botany, *Professor W. F. Ganong*, Smith College, Chairman. For the afternoon of January 1, the Society adjourned to the New York Botanical Garden where the museums, laboratories, and conservatories were inspected. The sessions were brought to a close with a dinner,

at which the retiring President, Dr. Erwin F. Smith, delivered the presidential address upon "Plant Pathology: A Retrospect and Prospect." For the ensuing year, Professor V. M. Spalding was elected President; Professor Byron D. Halsted, Vice-President; and Professor W. F. Ganong, Secretary-Treasurer.

The Society's committee on securing better reviews of botanical literature reported upon the organization of the Association Internationale des Botanistes and the purchase of the Botanisches Centralblatt by this Association. The Centralblatt, under the new management, is published by the firm of E. J. Brill, in Leyden, with Dr. J. P. Lotsy as acting editor-in-chief. The American representatives upon the editorial staff, with their respective departments, are as follows:

Phanerogams (systematic) and Chairman of the American Board, Professor William Trelease, Missouri Botanical Garden, St. Louis.

Morphology, Professor D. H. Campbell, Leland Stanford Junior University, California.

Cytology, Dr. C. J. Chamberlain, University of Chicago.

Physiology, Professor D. T. MacDougal, New York Botanical Garden, Bronx Park, New York City.

Algae, Dr. G. T. Moore, U. S. Department of Agriculture, Washington, D. C.

Paleontology, Professor D. P. Penhallow, McGill University, Montreal.

Fungi, and Secretary of the American Board, Dr. Hermann von Schrenk, Shaw School of Botany, St. Louis.

In order to facilitate the work of the editors, it is urged that authors send copies of their papers as soon as published to the editor in charge of the department concerned. The annual fee for membership in the Association is twenty-five shillings, all members receiving the Centralblatt *gratis*. The subscription price of the Centralblatt to non-members is twenty-eight shillings. Reviews are to be published in English, French or German. The first number of the Centralblatt issued by the new board of editors bears the date of January 3.

OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

(1) BULLETIN

A monthly journal devoted to general botany. Vol. 28, published in 1901, contained 706 pages of text and 49 full page plates. Price $3.00 per annum. For Europe 14 shillings. Dulau & Co., 37 Soho Square, London, are agents for England.

Of former volumes, only 1–6 and 19–28 can be supplied entire from the stock in hand, but the completion of sets will be undertaken. Yearly volumes 1–5 (1870–1874), one dollar each. Vol. 6 (1875–1879), extending over five years, is furnished at the subscription price of five dollars. Vols. 19–27 (1882–1900) are furnished at the published price of two dollars each.

Single copies (30 cts.) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The MEMOIRS are published at irregular intervals. Volumes 1–7 and 9 are now completed and No. 1, Part 1, of Vol. 8 and No. 1 of Vol. 11 have been issued. The subscription price is fixed at $3.00 per volume in advance. The numbers can also be purchased singly. A list of titles of the individual papers and of prices will be furnished on application.

(3) **The Preliminary Catalogue of Anthophyta and Pteridophyta** reported as growing within one hundred miles of New York, 1888. Price, $1.00.

Correspondence relating to the above publications should be addressed to

THE TORREY BOTANICAL CLUB
Columbia University
NEW YORK CITY

Vol. 2 February, 1902 No. 2

TORREYA

A Monthly Journal of Botanical Notes and News

EDITED FOR
THE TORREY BOTANICAL CLUB
BY
MARSHALL AVERY HOWE

JOHN TORREY, 1796–1873

CONTENTS

On the Behavior of Mutilated Seedlings: Byron D. Halsted 17
Observations on Lycopodium: Francis E. Lloyd 20
A Key to the North American Species of Hypholoma: F. S. Earle 22
A new Violet from New Jersey: Charles Louis Pollard 24
Shorter Notes
Animal Mycophagists: W. A. Murrill 25
Proceedings of the Club 26
News Items 31

Published for the Club
At North Queen Street, Lancaster, Pa.
by The New Era Printing Company

THE TORREY BOTANICAL CLUB

OFFICERS FOR 1902

President,

HON. ADDISON BROWN.

Vice-Presidents,

T. F. ALLEN, M.D. HENRY H. RUSBY, M.D.

Recording Secretary,

EDWARD S. BURGESS, PH.D.
Normal College, New York City.

Corresponding Secretary,

JOHN K. SMALL, PH.D.
Botanical Garden, Bronx Park, New York City.

Editor,

L. M. UNDERWOOD, Ph.D.,
Columbia University.

Treasurer,

FRANCIS E. LLOYD, A.M.
Columbia University.

Associate Editors,

NATHANIEL L. BRITTON, Ph.D. FRANCIS E. LLOYD, A.M.
CARLTON C. CURTIS, Ph.D. DANIEL T. MACDOUGAL, Ph.D.
MARSHALL A. HOWE, Ph.D. HERBERT M. RICHARDS, S.D.
ANNA MURRAY VAIL.

TORREYA is furnished to subscribers in the United States and Canada for one dollar per annum; single copies, fifteen cents. To subscribers elsewhere, five shillings, or the equivalent thereof. Postal or express money orders and drafts or personal checks on New York City banks are accepted in payment, but the rules of the New York Clearing House compel the request that ten cents be added to the amount of any other local checks that may be sent. Subscriptions are received only for full volumes, beginning with the January issue. Reprints will be furnished at cost prices. Subscriptions and remittances should be sent to Treasurer, Torrey Botanical Club, 41 North Queen St., Lancaster, Pa., or Columbia University, New York City.

Matter for publication should be addressed to

MARSHALL A. HOWE
New York Botanical Garden
Bronx Park, New York City

Vol. 2 No. 2

TORREYA

February, 1902

ON THE BEHAVIOR OF MUTILATED SEEDLINGS*

By Byron D. Halsted

The particular form of mutilation of seedlings here considered is that of the removal of the plumule. Several kinds of plants have been treated in this way during the past twelve months. The first of these was the garden radish, representing a small, large-rooted and short-lived plant. Soon after the seedling was above ground the plumule was removed upon alternate rows of plants, while the other rows were left to grow normally. The first thing to observe was the much deeper green of the cotyledons of the de-plumuled plants. This was followed by a remarkable elongation of the petiole and increase in size of the obcordate blade, the former attaining a length of three inches and the latter a breadth of an inch and a half. These cotyledons were raised at an angle of about 45° and the very dark green blade had a thickness nearly double that of the normal cotyledons. A microscopic examination showed that the greater thickness was due to increased size of the cells instead of to a multiplication of the layers. The chlorophyll was excessive and the amount of starch so great as practically to render them black when blanched with alcohol and iodized. The roots grew to nearly market size and had the tests been made with a turnip-shaped sort instead of a long variety, it is very likely that the roots would have been fit for the table.

The second species was the common morning glory [*Ipomoea purpurea* (L.)]. Here the cotyledons are large in the seedling,

* Abstract of a paper, with several photographs, prepared for the fifth meeting of the Society for Plant Morphology and Physiology at Columbia University, Jan. 1, 1902.

[The exact date of publication of each issue of Torreya is given in the succeeding number. Vol. 2, No. 1, comprising pages 1–16, was issued January 24, 1902.]

but quickly are lost from sight by the development of the much larger alternate true leaves. After holding on for a few days as a rule, the cotyledons lose their green color and drop from the stem. In the de-plumuled seedlings the petioles at once begin to elongate as was shown to be true with the radish, while the remarkable green develops in the blades that likewise become double, or more, the normal size and are the organs of photosynthesis for the mutilated plant. Their dark green is shared by the long, arched petioles (quite different in this respect from those of the radish) and the hypocotyl. The latter becomes of twice the sectional area of that of the normal plants, which are now several feet high and bearing flowers, and becomes a storehouse for the starch that is robbed of its proper use by the absence of any stem. The root system of the de-plumuled plant is not different from that of the normal specimens.

A third type of plant put to the test was the Hubbard squash, the seedlings of which naturally have large cotyledons. In these the seed-leaves remain near the soil without any apparent elongation of the hypocotyl, but there is a remarkable increase in the size of the cotyledons until they are sometimes four or more inches in length and very odd, to say the least. Normally, the true leaves come forth from the plumule rapidly and owing to their large size the cotyledons are soon out of sight and quickly wither away. Dwarfed squash plants depending entirely upon the cotyledons have been kept in apparently healthy condition for four months, the size remaining practically the same after the first four weeks. These plants, unlike those previously mentioned, need frequent attention, for buds will develop in the axils of the seed leaves, which when removed will be followed by others without any determined number. If left undisturbed a whole thick cluster of stems and small leaves will develop.

The egg-plant, as representing a slow-growing type of bushy plant, was employed for the test in question and it was found that this behaved in a manner similar to the radish, in that the petioles of the cotyledons became rigid and nearly upright, and bore the thick, almost fleshy, much enlarged oblanceolate blades well up in the air and sunshine. In this form the de-plumuled plants

will stand still in a very liberal sense of that term for an indefinite time, not weeks, but long months.

The last type of plant to be considered is represented here by the common sunflower (*Helianthus annuus* L.). As with the other types, the plants in alternate rows were de-plumuled. The first change was quickly observed, namely, the enlargement of the cotyledons ; but here the most noticeable thing observed was the elongation of the hypocotyl, which finally reached fully nine inches or double that of the normal plants. There is a greater tendency for hypocotyledonary growth in the sunflower than in any other of the types named, and this was remarkably accentuated in the mutilated plant. The structure of this stem, even at the end of three months, retained generally the primitive structure it possessed as a young seedling, that is, for example, the wood zone was made of a series of stout bundles, evenly disposed without the filling in and completion of the thick ring of xylem so well demonstrated in the normal plant at the same age.

The experiments illustrate how an organ normally designed to store food for the developing seedling may persist in case of an emergency and take on a greatly increased size for that purpose. The petiole may assume a direction in connection to its enlargement that will aid the blade in its work of photosynthesis. Along with these changes in the seed-leaves there may be others in surrounding parts, particularly the hypocotyl when it becomes thickened remarkably and green as in the morning glory and greatly elongated but slender as in the sunflower. In case of the radish a place for any surplus growth is provided for in the root, naturally destined to be fleshy and the hypocotyl is not modified.

Perhaps the greatest surprise is the length of time a plant will hold out when it is deprived of the means for making a successful struggle for life and of all possibility of reproduction.

Rutgers College, New Brunswick, N. J.

OBSERVATIONS ON LYCOPODIUM

By Francis E. Lloyd

In the summer of 1901, during a visit to Europe, I had the opportunity to observe several species of *Lycopodium* as they grow in parts of the Old World.

Lycopodium complanatum L.—A lot of sterile material of this plant was collected by Dr. Dunzinger of the Botanical Institute, University of München, in the Isarthal near München, on July 25, 1901, and was put at my disposal. Examination showed that the rhizome was blanched as a result of its growth in the mossy mats which clothe the ground in its habitat. The further fact of interest was noted that in this region *Lycopodium complanatum* innovates annually as *L. tristachyum* Pursh is known to do in North America. This behavior is probably a response to the much moister climate of Bavaria. *L. tristachyum* is apparently not to be found in the same locality. I have, however, seen material found growing in the vicinity of Bonn, answering to the North American *L. tristachyum* in every particular.

Lycopodium alpinum L.—This plant was found fairly abundant in the Austrian Tyrol on the flanks of the mountains at the Brenner Pass, and on the mountains behind Steinbach, which stands in the region in which Anton Kerner von Marilaun made his studies of the alpine vegetation. The time—July—was too early for the strobiles to have reached full development. The densely crowded tufts of foliage are often so tightly woven in with the neighboring plants, forming with them the dense carpet of the "alpine pastures," that it is at first quite difficult to recognize.

The striking fact about this plant is that a remarkable amount of dorsiventrality is developed in the branchlets, in spite of their generally vertical position. I have made the statement elsewhere * that this plant is the most strongly dorsiventral of all the plants in the group to which it belongs. Goebel,† however, takes the position that *L. complanatum* has that distinction.

* Lloyd, F. E., and Underwood, L. M. Bull. Torrey Club, 27: 147. 1900.
† Organography (translation), 105.

Regarding the much flattened stem and suppression of the under leaves as indicating the amount of dorsiventrality, it would appear that Professor Goebel is quite right. It was, however, not in this sense that I used the expression, for I referred rather to the remarkable amount of difference in the form of the leaves which are indeed trimorphic, a matter which has been sufficiently elucidated in the paper above alluded to. It would seem, therefore, that *Lycopodium alpinum* occupies a peculiar position, and may more properly be regarded as a parallel species with *L. complanatum*. The two species represent two different kinds of specialization and the peculiar features of the plant *L. alpinum* may perhaps be due to an attempt to revert to a radially symmetrical condition, a suggestion prompted by the fact of the orthotropous position of the branchlets above referred to.

Lycopodium Selago L.—The brood bodies or gemmae of *Lycopodium lucidulum* Michx. are produced on curiously modified branches, which do not, as many suppose, develop in the axils of leaves. It is not very widely known that some, the proximal, leaves of these peculiar branches are so modified as to form a mechanical apparatus for the expulsion of the distal part of the shoot, which constitutes the brood body.

I have been fortunate in extending this observation to *Lycopodium Selago*, which was found growing in the alpine regions of the mountains in the vicinity of Brenner. Observation shows that a very light touch is sufficient to release the mechanism which acts as a pinching catapult, if we may so call it, and may be compared to the somewhat similar mechanical condition seen in the dehiscent fruits in *Viola* and *Hamamelis*. The gemmae are cast to a distance of several centimeters, sometimes ten or more.

Undoubtedly the same will be shown to occur in *Lycopodium porophilum* Lloyd & Underwood.

Teachers College, Columbia University.

A KEY TO THE NORTH AMERICAN SPECIES OF HYPHOLOMA

By F. S. Earle

Key to the Sections

1. Pileus glabrous. 2.
   Pileus more or less silky or floccose. 3.

2. Pileus dry, often areolate with age. Sec. Fascicularia.
   Pileus viscid, not hygrophanous. Sec. Viscida.
   Pileus hygrophanous, changing color on drying. Sec. Appendicularia.

3. Pileus silky with innate fibrils. Sec. Velutina.
   Pileus floccose with separable scales. Sec. Flocculosa.

Section Fascicularia

1. Pileus some shade of gray, rimose. *H. cutifractum* Pk.
   Pileus some shade of yellow or brown. 2.

2. Flesh white or whitish. 3.
   Flesh bright yellow. 4.

3. Flesh bitter, lamellae at first whitish. *H. sublateritium* (Schaeff.) Sacc.
   Flesh mild, lamellae at first pale yellow. *H. perplexum* Pk.
   Flesh mild, lamellae at first smoky blue. *H. capnoides* (Fr.) Sacc.

4. Pileus papillate-umbonate. *H. papillatum* Pat.
   Pileus obtuse or subumbonate. 5.

5. Pileus dark yellowish-brown, lamellae at first sulphur-yellow then greenish. *H. fasciculare* (Huds.) Sacc.
   Pileus light yellowish-brown, lamellae at first greenish then olivaceous. *H. elaeodes* (Fr.) Sacc.

Section Viscida

1. Pileus tawny, radiately wrinkled. *H. rugocephalum* Atk.
   Pileus straw-yellow to pale orange, smooth. *H. ambiguum* Pk.

Section Appendicularia

1. Lamellae at first purplish or violet. 10.
   Lamellae not at first purplish or violet. 2.

2. Small, pileus 1 cm. or less. 3.
   Larger, pileus more than 1 cm. 4.

3. Stipe with an abruptly enlarged disc at base. *H. phyllogenum* Pk.
   Stipe equal, base not enlarged, blackening on drying. *H. modestum* Pk.

4. Pileus light-colored, white, pallid, alutaceous, etc. 5.
   Pileus darker, brown or yellowish-brown, at least when moist. 6.

5. Pileus hemispheric, apex of stipe substriate. *H. saccharinophilum* Pk.
   Pileus campanulate to expanded, apex of stipe subfurfuraceous. *H. incertum* Pk.

6. Pileus lighter on drying. 7.
Pileus darker on drying. *H. longipes* Pk.

7. Lamellae at first whitish. 8.
Lamellae at first brownish. 9.

8. Stipe white, hollow, pileus disc rugose. *H. madeodiscum* Pk.
Stipe white, hollow, pileus smooth. *H. appendiculatum* (Bull.) Sacc.
Stipe reddish, stuffed. *H. squalidum* Pk.

9. Stipe less than 8 cm., pallid, fibrillose. *H. atrifolium* Pk.
Stipe 8 cm. or more, white, striate. *H. hymenocephalum* Pk.
Stipe 8 cm. or more, sordid white with brown stains, uneven, nodulose-verrucose. *H. Californicum* Earle.

10. Small, pileus 1–2 cm. *H. olivaesporum* Ell. & Ev.
Large, pileus 5–11 cm. *H. Candolleanum* (Fr.) Sacc.

Section VELUTINA

1. Pileus small, 1–3 cm. 2.
Pileus larger, 5 cm. or more. 3.

2. Pileus grayish with black fibrils, lamellae at first white. *H. aggregatum* Pk.
Pileus brown, lamellae at first purplish. *H. comaropis* (Mont.) Sacc.

3. Pileus white or yellowish, indistinctly fibrillate, stipe smooth, shining. *H. nitidipes* Pk.
Pileus white then brown, with dark innate scales, stipe squamulose. *H. lacrimabundum* (Fr.) Sacc.

Section FLOCCULOSA

1. Pileus grayish-brown. *H. hirto-squamulosum* Pk.

In attempting to use the above key it must be borne in mind that it is constructed largely from published descriptions and that these descriptions are often faulty or insufficient, hence the key is necessarily purely artificial and does not attempt to indicate the relationship of the species except as to the division of the genus into sections. Further, it should be remembered that the fleshy fungi of only a very small part of the vast territory of North America have been studied with any degree of thoroughness, so that in all probability many forms remain to be discovered that cannot be referred to any of the above species. With these considerations in mind it is believed that such keys will be found useful by those who are interested in these plants.

NEW YORK BOTANICAL GARDEN.

A NEW VIOLET FROM NEW JERSEY*

By Charles Louis Pollard

Viola Angellae sp. nov.

Plant acaulescent, about 1 dm. high at flowering time, from a stout ascending or erect branching rootstock: young leaves sparsely pubescent, especially along the veins and on the petioles, cordate-ovate in outline, with a broad sinus, irregularly 5–7-lobed or some of them merely deeply sinuate; lobes all obtuse, more or less crenate: scapes somewhat exceeding the foliage: flowers violet-purple, darker at base: sepals oblong, very obtuse, 5 mm. long: petals oblong, rounded and entire at apex, 1–2 cm. long, nearly equal: aestival leaves with petioles 2–2.5 dm. long, greatly surpassing the persistent vernal foliage; the latter leaves more constantly 3-lobed, the lobes irregularly crenate-dentate: cleistogamous flowers few, borne on short, deflexed scapes: capsule oblong.

Types in the U. S. National Herbarium, no. 364,862 (for flowers) collected by Miss Lillie Angell at Orange, New Jersey, in May, 1900; also no. 352,093 (aestival leaves), same locality and collector, June, 1899.

Living plants of this species were sent to me by Miss Angell in 1899, then past the flowering season. The unusual feature of vernal and aestival foliage being present on the same plant attracted my notice, and I asked for additional material, which was afterward placed in my garden. In the spring of 1900 Miss Angell furnished flowering specimens, which I had an opportunity of comparing with those already in flower in the garden, and which proved to have held their characters perfectly. During the season of 1901 the plants have continued to thrive, and show no tendency to approach *V. palmata*, the most nearly related species. They have been grown in close proximity to *Viola palmata*, *V. Brittoniana*, *V. falcata* and *V. viarum*. At the commencement of flowering the species is less distinctive in appearance, although the very earliest leaves show some degree of lobation, which is hardly the case with those of *V. palmata*. The

* Published by permission of the Secretary of the Smithsonian Institution.

flower is quite different in color, and there is much less pubescence on the foliage. These early leaves, as in most violets, are borne on very short petioles, giving the plant a tufted appearance, and causing the flowers to stand out prominently. When the new leaves develop they speedily attain large dimensions, completely overtopping the vernal leaves and the few remaining flowers, so that the plant is really a remarkable sight throughout the greater part of the summer, with two distinct masses of foliage. The cleistogamous flowers are not produced, in cultivation at least, in the same abundance as those of *V. palmata*, so that my plants have not spread to any extent beyond the spot in which they were originally set out.

I wish to express my obligation to Miss Angell for the courtesies she has shown in furnishing notes and material, and to her is due the chief credit of its recognition as a distinct species. It grows in great abundance in tracts of open woodland in the Orange mountains, being associated with *V. palmata* there.

United States National Museum.

SHORTER NOTES

Animal Mycophagists.—I noticed last summer a large sphingid larva feeding with evident relish upon a plant of *Polyporus flavo-virens* in the woods near Blacksburg, Virginia. It is a matter of common observation that flies, snails, chipmunks and various other animals that inhabit the woods are fond of mushrooms, but it was rather surprising to find a green tomato-worm eating a yellowish-brown and rather tough fungus. Dr. Charles H. Peck in his forty-third report speaks of seeing large tufts of *Armillaria mellea* in the Adirondacks without pilei, which, he thinks, were eaten by deer. It is well known that mushrooms are sometimes eaten by cows, particularly in late summer when the pastures become dry. An interesting case of mycophagy was recently brought to my attention by Mr. M. W. Gorman, of Portland, Oregon, who has botanized considerably in Alaska. He says that in the region west of the Yukon River the small red, or "pine," squirrel lives during the winter upon

the seeds of *Picea alba* and mushrooms. The latter are collected in large quantities during the summer and placed in the forks of branches and other secure spots above the ground to dry. Three different kinds of brownish-colored agarics were noticed by Mr. Gorman. The squirrels, he says, visit their collections every day, even in the coldest weather.

W. A. Murrill.

PROCEEDINGS OF THE CLUB

Wednesday, November 27, 1901

The meeting of November 27 was held at the College of Pharmacy at 8 p. m., President Brown in the chair and twenty persons present.

The treasurer reported the names of members delinquent in payment of dues during three years past, and it was voted that he be directed to notify members more than two years in arrears that their names would be dropped from the roll in accordance with the provisions of the Constitution unless payment be made before the next annual meeting.

The scientific program consisted of the announced paper by Dr. W. A. Murrill on "The new International Botanical Association." The speaker gave an illustrated account of the meetings held in Geneva in August and described the organization and aims of the *Association internationale des Botanistes.*

Tuesday, December 10, 1901

The meeting was held at the Museum of the New York Botanical Garden, with Vice-President Rusby in the chair. Seventeen persons were present.

Miss Nellie Hewins, Maspeth, L. I., and Miss Rosina J. Rennert, 98 East 114th Street, New York City, were elected to membership.

The first paper on the scientific program was by Professor L. M. Underwood on "The Genus *Gleichenia.*" This was illustrated by specimens and sketches, showing the principal natural types. The paper will be published in full in an early number of the *Bulletin.*

Mrs. N. L. Britton presented "Notes on Macoun's recent Collection of Canadian Mosses," speaking of collections made by Professor J. Macoun during the past summer in the lower peninsula of Ontario between Lake Erie and Lake Ontario. Special mention was made of *Seligeria campylopoda* Kindb. previously known only from Owen Sound, but now collected at Niagara Falls. This moss ordinarily grows in pockets in limestone rocks and, being very small, is easily overlooked. Mrs. Britton alluded also to the synonymy of *Polytrichum Ohioense* Ren. & Card. This species was distributed by Drummond in his Musci Americani as *Polytrichum pallidisetum* and is apparently the same as what was afterwards recognized in the Manual of Lesquereux and James as *Polytrichum formosum*, var. *pallidisetum*, but whether the original *Polytrichum pallidisetum* of Funck is identical remains to be determined.

Dr. P. A. Rydberg in "A Review of a recent Monograph of the Ranunculaceae" discussed the work recently published by Dr. K. C. Davis.

The final paper was by Mr. S. H. Burnham and was entitled "Notes on the Flora of the Lake George Region." Mr. Burnham referred especially to *Bidens Beckii*, an aquatic plant growing in five or six feet of water in muddy streams, and to his experiences in collecting it through the ice during the last week of November of the present year. He also alluded to the restriction of *Castalia tuberosa* to the streams flowing directly into Lake Champlain while *Castalia odorata* alone is found in the Lake George basin.

MARSHALL A. HOWE,
Secretary pro tem.

ANNUAL MEETING, JANUARY 14, 1902

This meeting was held at 8 P. M. Jan. 14th, at the College of Pharmacy; Judge Brown in the chair, seventeen persons present.

The following were elected to active membership: Mr. I. C. Buchheister, 28 Pine Street, N. Y.; Mr. Stewart H. Burnham, N. Y. Botanical Garden; Dr. Henry Kraemer, Philadelphia College of Pharmacy, Philadelphia, Pa.

The committee on clerical aid reported as follows:

'Your committee appointed to consider the relief of the business pressure on the secretary, treasurer and editor owing to the increase in the business of the Club would recommend, (1) That the treasurer as the financial head of the Club should be responsible for all the financial administration of the Club, including the care of the subscription list and the sale of all the publications; (2) That he should prepare and keep the official list of members, thus relieving the secretary and editor of all responsibility in this line, and (3) That the Club should allow him an amount not exceeding one hundred and fifty dollars per annum to be used for clerical work connected with the keeping of the books of the Club and the sale of the publications.

This will necessitate the centralization of the Club's business at a single center."

Respectfully submitted,

L. M. Underwood,
D. T. MacDougal,
F. E. Lloyd,
Committee.

The above report was adopted, on motion of Dr. Rusby, seconded by Dr. Britton.

The committee on reporting proceedings recommended that the proceedings be published in Torreya instead of the *Bulletin*, beginning with January, 1902.

The secretary, Professor Burgess, presented and exhibited the bound volume of minutes for 1901, and reported 15 meetings held with an attendance varying from 10 to 30, the average 20; 28 active members elected, 12 resigned; total present membership 383, including 3 honorary, 142 corresponding, 238 active.

The editor, Professor Underwood, reported issue of the largest volume of the *Bulletin* in its history, 706 pages and 48 plates. The monthly index of recent literature has been reprinted as usual in card form and includes 983 titles for 1901, an increase of 127. Vol. 10 of the *Memoirs*, including the first part of Professor Burgess' "Aster Studies" is nearly through the press. No. 1 of Vol. 11, Dr. Griffiths' memoir on the North Ameri-

can Sordariaceae, has been printed. The principle adopted with the issue of Vol. 7 to make the memoirs pay for their own publication has been eminently successful. An increased sale of recent volumes and of sets was reported. The following forthcoming publications were announced: in Vol. 8, the conclusion of Professor Lloyd's studies on the embryology of the *Rubiaceae;* by Dr. A. W. Evans, "A Monograph of the *Lejeuneae* of the United States and Canada"; by Mrs. E. G. Britton and Miss Alexandrina Taylor, "The Life History of *Vittaria lineata";* in Vol. 11, "The *Ulotrichaceae* and *Chaetophoraceae* of the United States," by Dr. T. E. Hazen; Vol. 12, the second part of Professor Burgess' "Aster Studies."

Upon the acceptance of this report, the thanks of the Club were voted to the editor, Dr. Underwood, upon motion of Dr. Chamberlain, who expressed his profound feeling of indebtedness to the editorial board, and especially to the editor-in-chief, and his appreciation of the great labor involved, done without pecuniary compensation.

In response to call for reports on library and herbarium, Dr. Underwood remarked that we receive a large number of periodicals in exchange, all of which go to the library of the Botanical Garden, and are accessible to members; and Dr. Small remarked that the herbarium is now installed in its separate cases at the Botanical Garden, there to form the nucleus of a local flora of the 100-mile limit.

Dr. Britton reported as follows, regarding the local flora: Mr. Bicknell is continuing his observations on the flora of the region north of the Harlem and south of Yonkers. It is extremely desirable that some one take up the preparation of a diagnostic list of the metropolitan flora. Material for it exists already at the Botanical Garden, and in the collections of the Brooklyn Institute, the Staten Island Natural History Society, and the Geological Survey of New Jersey. It would be a work of great popular utility.

Regarding work on the cryptogamic flora, Professor Underwood reported that the immediate vicinity of New York had recently furnished the chief material for Dr. Griffiths' work on the

Sordariaceae, and for Dr. Hazen's work on the fresh water algae of the *Ulotrichaceae* and *Chaetophoraceae*. Special collections have been made of the Musci of Bronx Park and vicinity by Mrs. Britton, and of the fungi by Dr. Underwood and Professor Earle.

The field committee, through its chairman, Dr. L. Schoeney, reported the success of the plan of printing a single field program in advance for the whole season ; and in view of the difficulty of obtaining guides, made grateful acknowledgment of the aid given by the staff of the New York Botanical Garden.

The annual election followed. Dr. Britton remarked that under the new duties now to be required of the treasurer, it would be impracticable for Dr. Ferguson to continue to act, and it is important that the treasurer should be one who is convenient of access to the editor. On motion of Dr. Britton, seconded by Dr. Underwood, the Club expressed its grateful acknowledgments to the treasurer for his fidelity and diligence in discharge of the duties of his office.

The following board of officers was then elected : *President*, Hon. Addison Brown ; *Vice-Presidents*, Dr. T. F. Allen, Dr. H. H. Rusby ; *Treasurer*, Professor F. E. Lloyd ; *Recording Secretary*, Professor E. S. Burgess ; *Corresponding Secretary*, Dr. J. K. Small ; *Editor*, Professor L. M. Underwood ; *Associate Editors*, Dr. N. L. Britton, Dr. C. C. Curtis, Dr. Marshall A. Howe, Professor F. E. Lloyd, Dr. D. T. MacDougal, Dr. H. M. Richards, Miss Anna Murray Vail.

President Brown then announced the following appointments for standing committees for 1902: *Committee on Finance*, Dr. H. H. Rusby, Mr. J. I. Kane, Mr. C. F. Cox; *Committee on Admissions*, Cornelius Van Brunt, 319 E. 57th Street, Delia W. Marble, Bedford, N. Y., Dr. J. K. Small, Botanical Garden ; *Committee on Local Flora*, Professor N. L. Britton ; Phanerogamia—Eugene P. Bicknell, H. H. Rusby, M.D., Fanny A. Mulford ; Cryptogamia—Professor L. M. Underwood, Marshall A. Howe, Mrs. Elizabeth G. Britton ; *Committee on Excursions*, Dr. L. Schoeney, 23 W. 135th Street, Geo. V. Nash, Miss Marie L. Sanial, Eugene Smith, Miss L. K. Lawall ; *Committee on Program*, Dr. N. L. Britton, Dr. M. A. Howe, Dr. L. M. Underwood.

NEWS ITEMS

A valuable bulletin on "Range Improvements in Arizona," by Dr. David Griffiths, expert in charge of field management, has recently been published by the Bureau of Plant Industry of the U. S. Department of Agriculture.

An interesting paper by Mr. V. K. Chesnut, on "Plants used by the Indians of Mendocino County, California," has been issued as No. 3 of Vol. 7 of the Contributions from the U. S. National Herbarium.

Dr. D. T. MacDougal left New York on January 31, to spend a month or more in Arizona and northern Mexico. He plans to bring back living cacti, yuccas, agaves and other xerophytes for the New York Botanical Garden.

The Southern California Academy of Sciences has begun the publication of a monthly *Bulletin* under the editorship of Dr. Anstruther Davidson. The first two numbers include descriptions and figures of a new *Zauschneria* and of a new *Aster*.

Mr. K. Fujii, of the Imperial University of Tokyo, recently visited Columbia University and the New York Botanical Garden. Mr. Fujii was on his way to the German universities, where he expects to devote three years to botanical studies.

Through a blunder of the printers, something that was used for the second title page of Volume I. of TORREYA was printed on the second page of the cover of our January issue in place of the revised list of officers and our customary editorial statement.

Dr. Edward Palmer, the veteran explorer of Mexico, left Washington January 15, for a collecting expedition in the province of Santiago, Cuba. He will obtain the usual number of sets, which will be offered for sale upon his return. Dr. Palmer will be accompanied by Mr. Charles Louis Pollard and Mr. William Palmer, both of the United States National Museum, who will collect plants, mammals, birds and reptiles for that institution. As the party will pay especial attention to the unexplored mountains in the southern portion of the province, it is expected that the scientific results will be considerable.

The seventh annual meeting of the Vermont Botanical Club

was held at the University of Vermont, Burlington, January 24 and 25. Fully fifty botanists were in attendance, and the membership of the club was increased by the addition of fifteen names. Twenty-three papers covering a wide range of taxonomic, morphological, physiological, and economic subjects were presented. Papers by Messrs. A. L. Andrews, A. J. Grout, and T. E. Hazen added thirteen species of mosses and seven species of algae to the known flora of the state. Interesting results in the cultivation of native flowering plants and ferns were discussed by Miss Smith and Mrs. Horton, and the latter reported finding *Dryopteris simulata* Dav. at Brattleboro—the first record for Vermont. The persistent efforts of Mrs. Flynn, of Burlington, have added materially to the local flora, and, chiefly through the activity of President Brainerd, W. W. Eggleston and W. H. Blanchard, sixty-four species new to the state have been reported since the publication of the revised Flora a little more than a year ago. President Brainerd suggested as the most important problems for the next season the detailed field study of the critical genera, *Crataegus*, *Rubus* and *Viola*. Progress on the maple sap problems, and the subjects of forestry and nature study, and bacterial diseases of plants were treated in several papers. In response to the annual roll call many interesting notes were given. The address by Professor B. L. Robinson, of Harvard University, on "Some Recent Advances in the Classification of the Flowering Plants" was listened to with the greatest interest. Following an introduction outlining the history of taxonomic systems, a lucid exposition of the Eichlerian principles as developed by Engler and Prantl was given, and a brief comment on the new system of van Tieghem was added. The officers of the Club were reëlected as follows: President Ezra Brainerd, of Middlebury College, president; Mr. C. G. Pringle, vice-president; Professor L. R. Jones, secretary. The field meeting of the club next summer will probably take the form of an excursion to the islands and shores of Lake Champlain.—[T. E. H.]

OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

(1) BULLETIN

A monthly journal devoted to general botany. Vol. 28, published in 1901, contained 706 pages of text and 49 full page plates. Price $3.00 per annum. For Europe 14 shillings. Dulau & Co., 37 Soho Square, London, are agents for England.

Of former volumes, only 1–6 and 19–28 can be supplied entire from the stock in hand, but the completion of sets will be undertaken. Yearly volumes 1–5 (1870–1874), one dollar each. Vol. 6 (1875–1879), extending over five years, is furnished at the subscription price of five dollars. Vols. 19–27 (1882–1900) are furnished at the published price of two dollars each; Vol. 28, three dollars.

Single copies (30 cts.) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The MEMOIRS are published at irregular intervals. Volumes 1–7 and 9 are now completed and No. 1, Part 1, of Vol. 8 and No. 1 of Vol. 11 have been issued. The subscription price is fixed at $3.00 per volume in advance. The numbers can also be purchased singly. A list of titles of the individual papers and of prices will be furnished on application.

(3) **The Preliminary Catalogue of Anthophyta and Pteridophyta** reported as growing within one hundred miles of New York, 1888. Price, $1.00.

Correspondence relating to the above publications should be addressed to

THE TORREY BOTANICAL CLUB
Columbia University
NEW YORK CITY

Vol. 2 March, 1902 No. 3

TORREYA

A Monthly Journal of Botanical Notes and News

EDITED FOR
THE TORREY BOTANICAL CLUB
BY
MARSHALL AVERY HOWE

JOHN TORREY, 1796–1873

CONTENTS

Additional Notes on Liriodendron Leaves : Edward W. Berry 33
Keys to the North American Species of the Coprineæ : F. S. Earle 37
Handling Herbarium Specimens in Classes : Francis E. Lloyd 38
Notes on southwestern Plants : T. D. A. Cockerell 42
Shorter Notes
A new Peperomia from the Island of St. Kitts : N. L. Britton 43
Ilex myrtifolia with yellow Fruit : Roland M. Harper 43
Bryological Notes : Elizabeth G. Britton 44
Hypochaeris radicata L. : William T. Davis 45
Proceedings of the Club 45
News Items 48

Published for the Club
At North Queen Street, Lancaster, Pa.
by The New Era Printing Company

THE TORREY BOTANICAL CLUB

OFFICERS FOR 1902

President,

HON. ADDISON BROWN.

Vice-Presidents,

T. F. ALLEN, M.D. HENRY H. RUSBY, M.D.

Recording Secretary,

EDWARD S. BURGESS, PH.D.
Normal College, New York City.

Corresponding Secretary,

JOHN K. SMALL, PH.D.
Botanical Garden, Bronx Park, New York City.

Editor,

L. M. UNDERWOOD, Ph.D.,
Columbia University.

Treasurer,

FRANCIS E. LLOYD, A.M.
Columbia University.

Associate Editors,

NATHANIEL L. BRITTON, Ph.D. FRANCIS E. LLOYD, A.M.
CARLTON C. CURTIS, Ph.D. DANIEL T. MACDOUGAL, Ph.D.
MARSHALL A. HOWE, Ph.D. HERBERT M. RICHARDS, S.D.
ANNA MURRAY VAIL.

TORREYA is furnished to subscribers in the United States and Canada for one dollar per annum; single copies, fifteen cents. To subscribers elsewhere, five shillings, or the equivalent thereof. Postal or express money orders and drafts or personal checks on New York City banks are accepted in payment, but the rules of the New York Clearing House compel the request that ten cents be added to the amount of any other local checks that may be sent. Subscriptions are received only for full volumes, beginning with the January issue. Reprints will be furnished at cost prices. Subscriptions and remittances should be sent to Treasurer, Torrey Botanical Club, 41 North Queen St., Lancaster, Pa., or Columbia University, New York City.

Matter for publication should be addressed to

MARSHALL A. HOWE
New York Botanical Garden
Bronx Park, New York City

Vol. 2 No. 3

TORREYA

March, 1902

ADDITIONAL NOTES ON LIRIODENDRON LEAVES

By Edward W. Berry

(With Plates 1 and 2)

Any attempt at tracing the phylogeny of a species or group is always largely theoretical. The data upon which such speculations are based are always insufficient, especially when dealing with but one set of organs such as leaves. The extinct forms, generally the most essential for the correct understanding of the existing, are unknown for the most part and are represented by but here and there a fragment. At the same time phylogenetical hypotheses serve a coördinating purpose and are usually fertile with suggestions for further research.

The existing species of *Liriodendron* has never been adequately studied; especially is this true with regard to leaf-form, although the leaves furnish the only basis for comparison with the numerous fossil species. The response of organs such as leaves to their environment is generally rapid and we may be sure that similar changes in form may have appeared independently at any time when the proper environment was furnished; witness the interrelations of the variously denominated lobed leaves of the American Cretaceous. Thus it might seem that leaves afford little support for arguments as to ancestry or identity; and while this may be true when views are based on individual specimens or single "sports" it is not so far-reaching when arguments are supported by innumerable specimens, or series of specimens of a single species or genus showing constant gradations.

In a forthcoming article in the *Botanical Gazette* I have attempted a brief sketch of the probable relations of the various

[The exact date of publication of each issue of Torreya is given in the succeeding number. Vol. 2, No. 2, comprising pages 17–32, was issued February 21, 1902.]

species of *Liriodendron* and I will not attempt anything further in that line at this time, but will confine myself in these notes to calling attention to several interesting forms of these leaves and briefly discussing the evidence they offer as to the probable relations of some of the ancient members of this genus.

While *Liriodendron Tulipifera* has long been known to have variable leaves the extent of this variability has not been dreamed of, nor any reason assigned which would account for it. Darwin's law that wide-ranging species are variable is fully carried out, but, on the other hand, Sedgwick's rule that old species have lost their variability is not fulfilled. In fact, quite the reverse holds good, *Liriodendron* having reached quite a respectable old age and still retaining its variability with all the vigor of its Cretaceous days.

The accompanying plates picture some especially interesting leaves, all one-fourth natural size, from a collection of several hundred. One of the most curious is the sport shown at Fig. 7. The left half of the blade is somewhat normal in shape but the right half is reduced to a narrow lanceolate strip, which in venation bears a striking resemblance to an ordinary cotyledon. We have reconstructed this leaf, Fig. 6, as if both halves of the blade were narrowed as is the right half; this gives us a leaf strikingly like what we consider the primitive *Liriodendron* of the early Cretaceous or Jura-Cretaceous to have been. For comparison we show an ordinary cotyledon at Fig. 8, which, as will be seen, is very similar to Fig. 6.

The original *Liriodendron* leaf was long and narrow and as time passed there was a progressive widening of the blade and a corresponding reduction of the apex. It has been suggested that the mucronate point which usually tips the midrib of the modern leaf is a surviving rudiment of this once pointed apex. However this may be, we often find leaves with the acute ancestral apex (Figs. 4, 11, 12, 13, 14, 15). While the leaves bearing the tips shown at Fig. 11 were otherwise normally shaped leaves of large size, and while the leaves shown at Figs. 14, 15 were otherwise normal, the remaining acute-tipped leaves are very suggestive. The leaf shown at Fig. 4 is almost identical with the

Cretaceous species *Liriodendron semialatum* Lesq.* and while Fig. 13 at first sight suggests *Aralia*, *Cissites* or some other but little understood fossil leaf, it would be the logical successor of the *semialatum* form, being a more robust leaf with a shortened length and an increased breadth. It is however a remarkable leaf to have been borne on a tulip-tree and was sent to me from Columbus, Ohio by Mrs. W. A. Kellerman, an amateur botanist of that place.

It has become more and more evident to paleobotanists that many of the numerous leaves variously referred to *Credneria*, *Cissites*, *Araliopsis*, *Grewiopsis*, *Sassafras*, *Platanus*, etc., are, at least some of them, unnaturally identified and their true affinities but little understood; and while perhaps all of these and other genera are badly in need of revision, it would be rash to attempt one without far more material than is at present available. In this connection several of our leaf specimens of *Liriodendon Tulipifera* are particularly interesting; at the same time I do not feel justified in anything further than calling attention to them. The first, Fig. 12, shows a very anomalous leaf, one which almost exactly corresponds with the *Cissites acuminatus* of Lesquereux.† It stands alone in its uniqueness, and yet the tree which furnished it bore many leaves of a similar general shape and with similar venation; they were of all sizes, some of the specimens being 130 mm. in length, and all were like the specimen in question except that the acute apex was cuneate or with a wide obtuse sinus, the resulting apical portions of the blade showing a slight tendency to become lobed.

Another specimen which is of interest in this connection is Fig. 16, on which I will offer no comment other than to call attention to its resemblance to *Cissites obtusilobus* Lesq.‡ From this leaf I have a complete series showing a gradual shortening of the midrib and a gradual lengthening of the lateral lobes, ending in the curious form shown at Fig. 18 in which the leaf consists of a single orbicular lobe on each side, the blade being nearly four times as wide as the midrib is long. Fig. 10 shows a leaf which,

* Fl. Dak. Gr. 204. *pl. 25, f. 2–4; pl. 29, f 3.* (1891) 1892.

† Compare with fig. 3 on pl. 5, Cret. & Tert. Fl. 1883.

‡ Compare with fig. 5 on pl. 33, Fl. of Dak. Group. (1891) 1892.

if the lobes were altered as indicated by the dotted lines, would greatly resemble *Liriodendron giganteum* Lesq., particularly its variety *cruciforme*, in form, venation, and size.

Fig. 9 shows a modern leaf which is identical with that of *Liriodendron Meekii* Heer, and I find many modern leaves simulating this form more or less closely; as a rule, however, the lateral lobes are more oblique than in the form figured.

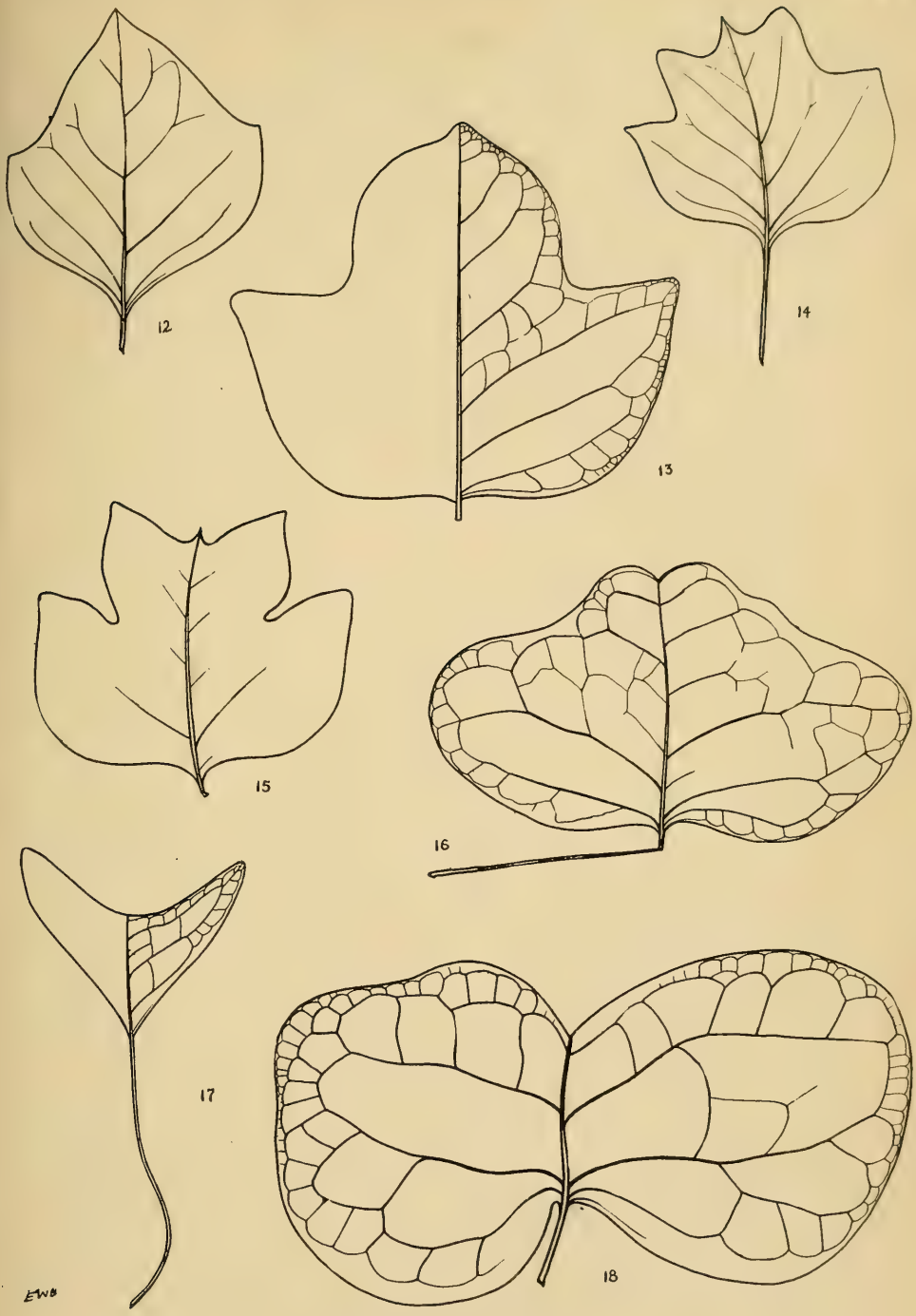
Figs. 1 and 3 show modern leaves which are identical with the *Phyllites obcordatus* of Heer, and which serve in a measure to confirm the reference of this species (of *Phyllites*) to *Liriodendron primaevum*. They also strengthen our conviction that *Liriodendron primaevum* Newb., *Liriodendropsis simplex* Newb., and *Liriodendropsis angustifolia* Newb. are valid species of *Liriodendron*, notwithstanding the fact that this view is criticized in some quarters.

Fig. 2 shows a modern leaf which has reverted to a still earlier stage in the history of the genus, the stage in which the simple ovate leaf had not yet become emarginate at the apex.

Fig. 5 shows a leaf of peculiar form related in a general way to the form figured at 12 as resembling *Cissites acuminatus*, but narrower, with a slightly emarginate apex and rounded lobes, the lateral margins and the primaries being somewhat more ascending. Finally, at Fig. 17, we picture the reduced, two-lobed, long-petioled, *Liriophyllum*-like leaf which is often found on the tulip-tree where there has been some diminution of nourishment, such as is caused by proximity to flowers or among leaves developed from forced buds. While this form is not constant in such situations, it is fairly common, there being an ever-present tendency to produce leaves of this shape or approximating it. The bud-scale of the blossom often bears at its apex a true leaf-blade almost exactly similar to the one here figured. A number of these leaves are shown in the September (1901) number of TORREYA.* They show that whereas a bud-scale has always been considered the morphological equivalent of a leaf, in this genus they are morphologically stipules, or modified leaf-segments.

* Berry, E. W. Notes on *Liriodendron* leaves. TORREYA, 1 : 105-107, *pl. 1, 2.* 1901.

LIRIODENDRON LEAVES.



LIRIODENDRON LEAVES.

When we look over these most diverse leaves, it is with difficulty that we can believe that they belong to but one species; were they found as fossils they would undoubtedly be referred to as many different species as there are leaves. However, they help to confirm the view that those ancient species of diverse shape are correctly identified as species of *Liriodendron*; and they also offer interesting evidence in support of the phylogenetical views advanced by the writer in the *Botanical Gazette*.*

It is to be hoped that new material, which will throw a new or fuller light on the genealogy of the group, awaits the collector in the various strata which have so long furnished representatives of this genus. Careful search should also be made for species in the splendid American Tertiary series. *Liriodendron* is common enough in the European Tertiary and must have been present in America during the deposition of all the formations subsequent to the Cretaceous. It is also very probable that when the Tertiary and later formations of eastern Asia are explored new species will be brought to light, as our flora to-day has so much in common with that of eastern Asia, and as it is only in that region that our living species of *Liriodendron*—perhaps in the form of a geographical variety—is elsewhere found.

Passaic, N. J., January 18, 1902.

KEYS TO THE NORTH AMERICAN SPECIES OF THE COPRINEAE

By F. S. Earle

The tribe Coprineae includes those genera of the Agaricaceae in which the lamellae deliquesce on the ripening of the spores, forming a colored liquid. This is comparable to the method by which the spores are set free in the Gasteromycetes. It is held by some to be a primitive character and to indicate that this is the oldest group of the Agaricaceae.

* To be published shortly.

Key to the Genera of the Coprineae*

Spores, and at maturity the lamellae, black or blackish-brown. *Coprinus.*
Spores, and at maturity the lamellae, rusty brown or reddish-brown. *Bolbitius.*

Key to the North American Species of Bolbitius

1. Stipe pilose-villous; pileus sulphur yellow. *B. vilipes* Fr.
   Stipe glabrous or floccose, not pilose-villous. 2.
2. Lamellae free. 3.
   Lamellae adnate; pileus light yellow; disc reddish. *B. nobilis* Pk.
   Lamellae long-decurrent; pileus bluish to rose-color. *B. macrorrhizus* B. & Mont.
3. Small; pileus 1–2½ cm. broad. *B. pulchrifolius* (Pk.) Mass.
   Larger; pileus 4–6 cm. broad. *B. radians* Morg.

Key to the North American Species of Coprinus

1. Universal veil present at least when young; pileus not splitting down the backs of the lamellae. 2.
   Universal veil absent; pileus membranaceous, splitting down the backs of the lamellae, smooth or scaly from the ruptured and exposed cells of the pileus. Sec. VI.
2. Universal veil remaining on the stipe as an annulus or as a volva. 3.
   Universal veil not forming an annulus or a volva. 4.
3. Base of stipe with a free-margined volva, annulus wanting. Sec. I.
   Annulus present at least when young, no volva. Sec. II.
4. Universal veil soon evanescent; pileus glabrate or with innate scales. Sec. III.
   Universal veil persisting on the pileus as patches, scales, fibrils of mealy granules (not glistening). Sec. IV.
   Universal veil (?) forming glistening, micaceous particles. Sec. V.

Coprinus—Sec. I.

No species recorded from North America.

Coprinus—Sec. II.

1. Annulus subpersistent, movable. 2.
   Annulus soon evanescent. 4.
   Annulus persistent, fixed, medial. *C. armillaris* Fr.
2. Pileus fleshy; lamellae linear. 3.
   Pileus membranaceous; lamellae ventricose. *C. squarrosus* Morg.
3. Large; pileus 8–10 cm. high. *C. comatus* Fr.
   Smaller; pileus 5–7 cm. high. *C. comatus brevic·ps* Pk.
4. Small; pileus 2–4 cm. broad. 5.
   Larger; pileus 5–11 cm. broad, lamellae broad. 6.
5. Spores large, 20–25 μ long; lamellae never rose-colored. *C. macrosporus* Pk.
   Spores smaller, 9 μ long; lamellae white to rose, then black. *C. variegata* Pk.

* In Engler & Prantl, Pflanzenfamilien, the peculiar genus *Montagnites* is included in the Coprineae. As this genus lacks the distinguishing character of deliquescent lamellae and diverges widely in other important characters it seems best to exclude it.

6. Pileus with innate brown squamules. *C. atramentarius* (Bull.) Fr.
Pileus floccose-tomentose, then glabrate. *C. quadrifidus* Pk.

COPRINUS—SEC. III.

1. Spores roughened; pileus campanulate, grayish-brown. *C. insignis* Pk.
Spores smooth. 2.
2. Pileus smooth or rimose; spores subhyaline. *C. fuscescens* (Schaeff.) Fr.
Pileus with innate brown scales; spores fuscous. *C. stenophyllus* Mont.

COPRINUS—SEC. IV.

1. Universal veil thick, breaking into persistent patches. 2.
Universal veil breaking into scales or fibrils. 3.
Universal veil breaking into mealy granules. *C. semilanatus* Pk.
2. Pileus calyptrate; spores large, 15–20 μ. *C. calyptratus* Pk.
Pileus with broad white patch-like scales; spores 8–10 μ long. *C. ebulbosus* Pk.
3. Lamellae attached to the stipe. 4.
Lamellae free. 8.
4. Prevailing color white or gray. 5.
Prevailing color yellow or brown. 7.
5. Small; pileus 1 cm. broad or less. *C. brassicae* Pk.
Larger; pileus reaching 2–3 cm. in width. 6.
6. Pileus pure white. *C. niveus* (Pers.) Fr.
Pileus gray or pallid. *C. laniger* Pk.
7. Pileus soon expanded, fuscous. *C. Seymouri* Pk.
Pileus cylindrical or campanulate, pale ochraceous. *C. virgineus* Bann. & Pk.
Pileus campanulate, fuliginous, disc spadiceous. *C domesticus* (Pers.) Fr.
8. Prevailing color white or gray. 9.
Prevailing color yellow or brown. 11.
9. Stipe glabrous. 10.
Stipe floccose, at least when young. *C. Jonesii* Pk.
10. Spores navicular. *C. Cubensis* B. & C.
Spores curved, stipe reddish. *C. Spraguei* B. & C.
Spores globose. *C. rotundisporus* Pk.
Spores ovate; pileus 2–5 cm. broad. *C. arenatus* Pk.
Spores ovate or oval; pileus 8–12 mm. broad. *C. nycthemerus* Fr.
11. Pileus plumbeous, disc fuscous. *C. plumbeus* Pk.
Pileus pale fuscous, subglobose. *C. subglobatus* B. & C.
Pileus pale buff, campanulate. *C. lacerata* Pk.

COPRINUS—SEC. V.

1. Pileus campanulate, fulvo-ferruginous. *C. micaceus* (Bull.) Fr.

COPRINUS—SEC. VI.

1. Pileus more or less scurfy or scaly. 2.
Pileus glabrate. 6.
2. Lamellae attached to the stipe. 3.
Lamellae free. 5.

3. Pileus gray.	*C. apiculatus* Pk.
Pileus reddish.	*C. ephemerus* Fr.
Pileus yellowish-brown, darker with age.	4.
4. Pileus small, 1–1½ cm. broad; lamellae subdistant.	*C. aquatilis* Pk.
Pileus larger, 3–5 cm. broad; lamellae crowded.	*C. Berkeleyi* Mont.
5. Pileus with brownish scurf.	*C. Wrightii* B. & C.
Pileus with grayish scurf.	*C. radiatus* Fr.
6. Lamellae attached to the stipe.	7.
Lamellae free, not reaching the stipe.	*C. plicatilis* (Curt.) Fr.
7. Growing from a sclerotium.	*C. sclerotigenus* E. & E.
Not from a sclerotium.	8.
8. Lamellae subdistant.	*C. silvaticus* Pk.
Lamellae crowded.	*C. angulatus* Pk.

New York Botanical Garden.

HANDLING HERBARIUM SPECIMENS IN CLASSES

By Francis E. Lloyd

Teachers who make use of herbarium material of any kind for demonstration in classes, especially if the number of students is large, have experienced considerable discomfort incident to the danger of damage to the specimens by rough handling. But as many of us know, with even careful handling, the danger is still great, and any method of avoiding the danger at small cost will be welcomed.

Heretofore, glazed frames of various forms have been used to some extent, and these have generally a fair degree of efficiency. The only serious objection has been their weight and costliness, and the danger of glass breakage is here, too, not slight. At any rate such frames have not come into general use. The objection may be avoided, however, by the use of sheets of transparent celluloid or xylonite instead of glass. These sheets may be used in two ways, as follows.

If it is desired to show ordinary herbarium specimens a pocket may be constructed large enough to engage an herbarium sheet of ordinary size. The pocket is made by taking a sheet of stiff cardboard and of xylonite of the same size. One edge of both xylonite and cardboard should be bound with photographers' or

picture-framers' binding strips, and the sheets then laid together and bound around the other three edges. If it is desired, the xylonite and cardboard may be separated by narrow strips of Bristol-board of appropriate thickness. Such an apparatus is somewhat pliable, very durable, light and highly protective to the specimen temporarily placed therein.

Specimens to show points of morphological interest may be mounted directly on cards of any desired size, labelled according to wish, then covered with xylonite and bound with paper strips. I have found 6½″ x 8½″ photographers' mounting cards very useful and a good convenient size. Specimens showing adaptations of various kinds, of smaller plants such as mosses, liverworts, lichens and the like, may be thus mounted at small cost in a quantity of duplicates. These may then be used repeatedly, effecting an immense saving of time and energy to the teacher who has now always at hand plenty of the choicest material, if a little effort is once made to collect the best specimens available and to mount them properly. Pressing and drying is made quick and easy by the method devised by Rostowzew, and recently described by Richards.*

Such preparations will stand an enormous amount of wear and tear; are, in fact, practically indestructible. It is wise to fasten the specimens well on the cards, strips being used if necessary. To an ingenious teacher this method of handling specimens will be susceptible of many useful modifications. Xylonite may be obtained from dealers in general laboratory supplies and probably from dealers in photographic materials.

Teachers College, Columbia University.

* Torreya, 1: 145. D. 1901.

NOTES ON SOUTHWESTERN PLANTS

By T. D. A. Cockerell

Peritoma serrulatum albiflorum. Flowers pure white. (*Cleome serrulata f. albiflora* Ckll. Proc. Acad. Nat. Sci. Phila. 1896 : 34 ; misprinted *C. albiflora*). This white-flowered form occurs occasionally in Colorado and northern New Mexico, along with the type ; but for many miles westward of Peach Springs, Arizona, along the railroad, it constitutes a local race, to the exclusion of the type. At Williams, Arizona, on the other hand, the plants are all of the typical form.

Fallugia micrantha Ckll. Entom. News, 1901 : 41. This northern form was briefly described in the place cited, where an account is given of its insect visitors. It is readily known by its small flowers, 23–26 mm. diameter. At Las Vegas Hot Springs (7,000 ft.) it reaches its greatest altitudinal limit, and is completely dioecious, which is not the case at Mesilla Park.

Lupinus Helleri Greene, Pittonia, **4** : 134. Santa Fé, N. M. This name may be objected to on account of the prior *L. Hellerae* Heller, though I do not consider the names identical. However, it appears to me that *L. Helleri* is *L. decumbens argophyllus*, A. Gray (Pl. Fendl. 37. 1849), so its proper name will be **Lupinus argophyllus**. The type locality of *argophyllus* is " around Santa Fé," where, in fact, it is abundant.

Carduus ochrocentrus forma **albiflora**, flowers white. This is quite common in the region just north of Las Vegas, N. M., growing with the type. I record it because Britton (Man. Flora N. E. States, 1032) says " flowers purple (rarely white ?)." The plant which grows around Las Vegas and Santa Fé is the real *C. ochrocentrus ;* the common plant of Colorado is somewhat different, and may have to be separated.

Kallstroemia brachystylis Vail. Common at Raton, N. M., which is only just south of the Colorado border. This extends its range considerably northward.

Leucampyx Newberryi A. Gray. On Crews' Mesa, near Beulah, N. M., I found a plant with some flowers having pale

pink rays. The ordinary white form is abundant in the same locality.

Taraxacum Taraxacum (L.) Karst. In full flower April 23, 1901, at Las Vegas, N. M., attracting the very earliest bees of the season. Two caught on the flowers were females of *Halictus anomalus* Rob., and *H. pruinosus* Rob. Müller says there are 100 to over 200 florets in a head of the dandelion; seven Las Vegas flowers gave these numbers: 120, 100, 150, 104, 138, 150, 145.

East Las Vegas, New Mexico.

SHORTER NOTES

A New Peperomia from the Island of St. Kitts.—**Peperomia Davisii** Britton, n. sp. Climbing on the bases of trees, finely puberulent nearly all over, 1.5–3 dm. long. Leaves orbicular-ovate, abruptly acute, thick, distinctly cordate at the base, 3–4 cm. long and about as wide, palmately veined, the midvein rather prominent and broad, the lateral veins 3 or 4 pairs, very delicate, the stout petiole as long as the blade or shorter; spikes geminate, their common peduncle 3–4 cm. long, bearing at the top a lanceolate-oblong acute bract about 1 cm. long, the peduncle of one of the spikes bearing 1 or 2 similar smaller bracts, that of the other spike bractless; spikes 3–4 cm. long.

On forest slopes of Mount Misery, Island of St. Kitts, British West Indies, September, 1901, N. L. Britton and J. F. Cowell, no. 506. Not uncommon in the forests of this island, at altitudes of 600 to 1,000 meters; now in cultivation at the New York Botanical Garden. The specific name is in honor of Mr. B. S. Davis, a resident planter of St. Kitts, who is much interested in its flora and who kindly gave us valuable assistance in our exploration of its forests on the Belmont and Lambert estates. The species is probably nearest related to *Peperomia inophylla* Griseb., of Cuba, differing markedly in its cordate leaves and geminate spikes. N. L. Britton.

Ilex myrtifolia with yellow Fruit.—The occurrence of yellow fruit in *Ilex opaca* has long been known to botanists,

having been mentioned as long ago as 1788 by Thomas Walter (Fl. Car. 241), who treated our species as identical with the European *Ilex Aquifolium*, *I. opaca* not having been described until the following year. A yellow-fruited form of *I. verticillata* from Massachusetts has recently been described by Dr. Robinson (Rhodora, 2 : 106. My. 1900) as forma *chrysocarpa* (and elevated to a variety later in the same year by Mr. Heller in his Catalogue of North American Plants). It would therefore not be surprising if other species of the same genus should occasionally present the same variation, though I find no published record of it outside of the two just mentioned.

But a few days ago I received from Miss Laura Bennett of Camilla, Georgia, some specimens of *Ilex myrtifolia* Walt. (a species ranging from North Carolina to Florida and Louisiana), with yellow berries, but otherwise indistinguishable from the normal form. In the absence of other known differences it does not seem worth while to give a distinctive name to this yellow-berried form.

Miss Bennett remarks that it is not so common as the various red-berried species, and for that reason is more highly prized; both kinds being used for Christmas decorations.

Roland M. Harper.

Bryological Notes.—Miss Harriet Bailey has collected, in the vicinity of Kentville, Nova Scotia, this last summer, a number of rare mosses, which she has donated to the Garden Herbarium. Among them is *Bryum proligerum*, growing on a hard sandy cliff in fine condition, the stems crowded with propagula, and one plant fruiting. *Raphidostegium Jamesii* also was collected on spruce trunks, its usual habitat.

Mr. E. J. Hill has sent specimens of *Fissidens grandifrons*, collected on the wet face of a sandstone cliff at Starred Rock, Utica, Illinois, which show particularly well the method of propagation of this species, thus far not known to fruit in America. It forms small lateral buds, which send out radicles when the buds first develop; ultimately they drop off, forming new plants. This species is not recorded by Correns.

Elizabeth G. Britton.

HYPOCHAERIS RADICATA L.—In Dr. Britton's recently published "Manual of the Flora of the Northern States and Canada," the habitat of this plant is given as "waste places, Long Island to New Jersey." Last summer it was discovered to be well established in three localities on Staten Island, namely on Todt Hill, near Egbertville, and in the grounds of the S. R. Smith Infirmary. In the last named locality it persists in spite of the mowing machine. An interesting habit of the plant is the closing of its flowers early in the afternoon, even on bright sunny days.

WILLIAM T. DAVIS.

PROCEEDINGS OF THE CLUB

WEDNESDAY, JANUARY 29, 1902

The meeting was held at the Museum of the New York Botanical Garden; seventeen persons present, Dr. MacDougal in the chair.

The first paper was by Dr. Britton, entitled "Notes on the Crassulaceae," and is to appear in print, being a part of a contribution toward the projected Flora of North America. Remarks followed by Dr. C. C. Curtis, Dr. Rydberg, Dr. Small, Dr. MacDougal and Mrs. Britton. The distribution of the Crassulaceae was commented on, Dr. Britton speaking of the isolated colonies of high mountain species, which seem to have continuously interbred and in which this process seems responsible for the development of specific characters.

The second paper, by Professor F. S. Earle, entitled "New Genera of Fungi," founded on representatives from California and New Mexico, will soon appear in the *Bulletin of the New York Botanical Garden.*

Professor Earle also exhibited a rosebush from under glass at the Garden, the roots of which had been attacked by a fungus now under examination. The mycelium is abundant in the fibrous roots, also in the bark and cambium immediately above ground, and has caused a sudden yellowing and drooping of the leaves. The rosebush shown had been artifically infected from cultures of a fungus taken from similarly diseased bushes grown in New Jersey.

Dr. MacDougal recalled the suggestion that potatoes are the result of fungal infection of the underground stem; it is said that no one has ever examined a potato tuber without finding traces of a fungus in it. In many cases of precocious blooming among both wild and cultivated plants, the cause is stimulus from similar infection.

Dr. MacDougal also exhibited specimens of *Raoulia* and *Haastia*, known as "vegetable sheep," two remarkable alpine xerophytes from an altitude of 4,000 feet on the mountains of New Zealand. They are composites related to *Gnaphalium*.

Dr. Rydberg spoke of a Rocky Mountain phlox with similar growth in cushion-like masses.

Mrs. Britton reported on the progress of her studies of a *Vittaria* collection made by Dr. Britton at St. Kitts, and exhibited drawings. There is a present indication that two different specific names have been in use for different stages of the same life history.

EDWARD S. BURGESS,
Secretary.

TUESDAY, FEBRUARY 11, 1902

The meeting was held at the College of Pharmacy; the President, Judge Addison Brown, in the chair; 37 persons present.

The President presented for distribution to members of the Club copies of Dr. Gattinger's Flora of Tennessee.

Dr. A. J. Grout delivered an address, illustrated by numerous lantern slides, on the botanical features of Mt. Mansfield, Vermont. A general discussion of the distribution of mountain plants followed the address, which was participated in by Dr. Underwood, Dr. Rydberg, Dr. Grout, Mr. Chamberlin, Dr. Murrill and the Secretary *pro tem.*

The following is an abstract of Dr. Grout's paper:

The alpine and subalpine flora of Mt. Mansfield and Smugglers' Notch is of great interest. While Mt. Mansfield (4329 ft.) is not so high as Mt. Washington, and the Notch has not the profile or the flume that have rendered the Franconia Notch historic, yet each has scenic and floral attractions all its own, and but little inferior to those more widely known in the White Mountain region.

The "spring" which wells up a full-grown brook just at the entrance of the Notch with water of icy coldness at all seasons of the year; Bingham Falls a few miles farther down this same brook, with its fantastic gorge and wild cascade; the steep cliffs of the Notch rising thousands of feet on either hand, with their numerous ravines and rich subalpine flora, all have a potent attraction to every one who has visited and seen.

Along these rivulets, by whose wearing action the cliffs have been made possible to man, are found *Dryopteris fragrans*, *Woodsia glabella* and *W. alpina*, *Pellaea gracilis*, *Polystichum Braunii*, *Asplenium viride*, *Blephariglottis grandiflora*, *Saxifraga oppositifolia*, *S. Aizoön* and *S. autumnalis*, *Astragalus Jesupi*, *Hedysarum Americanum*, *Draba incana*, *Arenaria verna*, *Pyrola minor*, *Gentiana acuta*, *Castilleja acuminata*, *Erigeron hyssopifolius*, *Solidago Virgaurca*, vars. and that choicest of beauties and wonders, the insect-eating *Pinguicula vulgaris*.

On the summit of the mountain the scenery is marvelously beautiful, whether one clambers down to the "Lake of the Clouds" on a clear day and looks back at the rugged majestic "Chin" or sits on the western side of the "Nose" at sunset and sees the distant golden glint of Lake Champlain, or rises before dawn and watches the sun drink up the rolling seas of fog.

The summit flora also has its attractions for the botanists; *Polygonum viviparum*, *Comandra livida*, *Viburnum pauciflorum*, *Salix Uva-ursi*, *Vaccinium caespitosum*, *V. uliginosum*, *Vitis-Idaca*, *Nabalus Boottii* and *Diapensia* are some names to conjure one's exchanges with.

And mosses and lichens are very abundant. The speaker has personally collected there two varieties new to North America, and not yet collected elsewhere on the continent, namely, *Hypnum fluitans Atlanticum* Ren. and *Dicranum longifolium subalpinum* Milde.

A comparison of the flora of this region and that of Mt. Washington, brings out the fact that here are several northern plants not found at the loftier elevation of the Mt. Washington region, although the conditions there are more severely alpine and supposedly more favorable. None of the saxifrages mentioned above can be

found in the White Mountain region, but another alpine species, *S. rivularis*, occurs there. This is only one of several similar cases hard to account for, on a theory of a residual flora, as the regions are so near to each other and the conditions are so similar.

N. L. Britton,
Secretary pro tem.

NEWS ITEMS

Mr. Elmer D. Merrill has resigned his position as assistant in charge of the agrostological collections of the U. S. Department of Agriculture in order to accept an appointment in the Philippines.

Dr. Valery Havard, Deputy Surgeon General of the United States Army, recently Chief Surgeon of the Division of Cuba, is now stationed at Ft. Monroe, Virginia.

Among the botanists visiting New York of late have been Professor F. A. F. C. Went, of Utrecht, Holland, Professor Conway MacMillan of the University of Minnesota, and Dr. Theodore Holm, of Washington, D. C.

The February number of the *Journal of Botany* announces the death of Mr. Alfred W. Bennett, one of the authors of Bennett and Murray's Cryptogamic Botany, and otherwise well known as a botanist.

Two new Memoirs of the Torrey Botanical Club were published in February. "The comparative Embryology of the Rubiaceae," by Francis Ernest Lloyd completes No. 1 (pp. 1–112; pl. 1–15) of Vol. 8; and "The Lejeuneae of the United States and Canada," by Alexander W. Evans, constitutes No. 2 (pp. 113–183; pl. 16–22) of the same volume. "The Life History of *Vittaria lineata*," by E. G. Britton and Alexandrina Taylor, completing Vol. 8, is soon to be published. The price of No. 1, separately, is $1.75, of No. 2, $1.00.

OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

(1) BULLETIN

A monthly journal devoted to general botany. Vol. 28, published in 1901, contained 706 pages of text and 49 full page plates. Price $3.00 per annum. For Europe 14 shillings. Dulau & Co., 37 Soho Square, London, are agents for England.

Of former volumes, only 1–6 and 19–28 can be supplied entire from the stock in hand, but the completion of sets will be undertaken. Yearly volumes 1–5 (1870–1874), one dollar each. Vol. 6 (1875–1879), extending over five years, is furnished at the subscription price of five dollars. Vols. 19–27 (1882–1900) are furnished at the published price of two dollars each; Vol. 28, three dollars.

Single copies (30 cts.) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The MEMOIRS are published at irregular intervals. Volumes 1–7 and 9 are now completed and Nos. 1 and 2 of Vol. 8 and No. 1 of Vol. 11 have been issued. The subscription price is fixed at $3.00 per volume in advance. The numbers can also be purchased singly. A list of titles of the individual papers and of prices will be furnished on application.

(3) **The Preliminary Catalogue of Anthophyta and Pteridophyta** reported as growing within one hundred miles of New York, 1888. Price, $1.00.

Correspondence relating to the above publications should be addressed to

THE TORREY BOTANICAL CLUB
Columbia University
NEW YORK CITY

Vol. 2 April, 1902 No. 4

TORREYA

A Monthly Journal of Botanical Notes and News

EDITED FOR
THE TORREY BOTANICAL CLUB
BY
MARSHALL AVERY HOWE

JOHN TORREY, 1796–1873

CONTENTS

Additions to the recorded Flora of Long Island: A. J. Grout 49
A Key to the North American Genera and Species of the Hygrophoreae—I: F. S. Earle 53
Shorter Notes
A Saxifrage from the Queen Charlotte Islands and its Relatives: J. K. Small 55
Reviews
MacDougal's Elementary Plant Physiology: C. C. Curtis 56
Proceedings of the Club: Edward S. Burgess 58
News Items 62

Published for the Club
At North Queen Street, Lancaster, Pa.
by The New Era Printing Company

THE TORREY BOTANICAL CLUB

OFFICERS FOR 1902

President,

HON. ADDISON BROWN.

Vice-Presidents,

T. F. ALLEN, M.D. HENRY H. RUSBY, M.D.

Recording Secretary,

EDWARD S. BURGESS, PH.D.
Normal College, New York City.

Corresponding Secretary,

JOHN K. SMALL, PH.D.
Botanical Garden, Bronx Park, New York City.

Editor,

L. M. UNDERWOOD, Ph.D.,
Columbia University.

Treasurer,

FRANCIS E. LLOYD, A.M.
Columbia University.

Associate Editors,

NATHANIEL L. BRITTON, Ph.D. FRANCIS E. LLOYD, A.M.
CARLTON C. CURTIS, Ph.D. DANIEL T. MACDOUGAL, Ph.D.
MARSHALL A. HOWE, Ph.D. HERBERT M. RICHARDS, S.D.
ANNA MURRAY VAIL.

TORREYA is furnished to subscribers in the United States and Canada for one dollar per annum; single copies, fifteen cents. To subscribers elsewhere, five shillings, or the equivalent thereof. Postal or express money orders and drafts or personal checks on New York City banks are accepted in payment, but the rules of the New York Clearing House compel the request that ten cents be added to the amount of any other local checks that may be sent. Subscriptions are received only for full volumes, beginning with the January issue. Reprints will be furnished at cost prices. Subscriptions and remittances should be sent to Treasurer, Torrey Botanical Club, 41 North Queen St., Lancaster, Pa., or Columbia University, New York City.

Matter for publication should be addressed to

MARSHALL A. HOWE
New York Botanical Garden
Bronx Park, New York City

Vol. 2 No. 4

TORREYA

April, 1902

ADDITIONS TO THE RECORDED FLORA OF LONG ISLAND

By A. J. Grout

The following list of plants contains additions to the list published by Dr. Smith Ely Jelliffe in 1899. A few of the plants were in the herbarium of the Brooklyn Institute of Arts and Sciences at the time Dr. Jelliffe's list was published. Some others were in the herbarium of the late Rev. Dr. George D. Hulst, which has recently been presented to the Museum. Shortly before his death Dr. Hulst prepared a list of additions to Dr. Jelliffe's Flora, which contained a number of species not incorporated here because of the lack of specimens of such in any accessible herbarium.

The greater portion of the flowerless plants have been collected by the writer during the past three years and unless otherwise noted all plants listed were collected by him. The fungi are very poorly represented in Dr. Jelliffe's list and it is to be hoped that some one who has made a study of these plants will come forward with additional information.

Fungi

Anthurus borealis Burt. In a back yard, Brooklyn; brought in by a High School boy.

Microsphaera quercina (Schw.) Burrill. On *Quercus alba*, Jamaica.

Microsphaera grossulariae (Wallr.) Lév. Common on leaves of *Sambucus Canadensis*.

Phyllactinia suffulta (Reb.) Sacc. On chestnut leaves, Jamaica. Undoubtedly common.

[The exact date of publication of each issue of Torreya is given in the succeeding number. Vol. 2, No. 3, comprising pages 33–48, was issued March 12, 1902.]

HEPATICAE

Anthoceros punctatus L. Muddy borders of stagnant pools, Forest Park. Determined by Dr. M. A. Howe.

MUSCI

Buxbaumia aphylla L. Soil in sandy woods near water works, Jamaica South.

Pleuridium subulatum (L.) Rabenh. Sandy fields, Lawrence.

Mnium punctatum L. var. *elatum* Schimp. Swamp, Jamaica.

Mnium rostratum Schrad. On soil, Jamaica.

Thelia asprella (Schimp.) Sulliv. Bark of tree, Cold Spring.

Thelia Lescurii Sulliv. Sandy soil by railroad track, Rockville Center, Lynbrook.

Hypnum chrysophyllum Brid. Sticks and hummocks in swamps. Valley Stream. New Lots, *Brainerd.*

H. cordifolium Hedw. Bare wet spots in swamps, Valley Stream.

H. crista-castrensis L. Rotting base of tree, Cold Spring.

H. molluscum Hedw. Sandy soil in woods, Jamaica. Very abundant at Northport.

H. Patientiae Lindb. Soil in swamps, Valley Stream.

Plagiothecium Ruthei Limpr. Abundant on hummocks and about bases of trees, Valley Stream.

This is Dr. Best's determination of the moss issued as nos. 55 and 55a of my N. Am. Musci Pleurocarpi, confirmed by J. Cardot and Dr. E. Levier. It is monoicous, hence is not *P. sylvaticum.* It is too strongly differentiated from *P. denticulatum* to be with propriety included under that species, although I was at one time inclined to place it under forma *propagulifera* Ruthe, because of the numerous protonema-like propagula borne on the base of the midribs of the leaves. A very striking character of this plant is the folding together of the leaf at the base to sheathe the leaf next above.

Plagiothecium striatellum (Brid.) Lindb. Common in swamps, but having spreading leaves like a *Campylium.*

Raphidostegium admistum (Sulliv.). *Hypnum admistum*

Sulliv. Proc. Am. Acad. 5: 289. 1861. On peaty soil near swamp, Jamaica.

R. recurvans (Michx.) J. & S. Peaty soil in swamp, Valley Stream.

Brachythecium acutum (Mitt.) Sulliv. On ground in swamps, Valley Stream.

B. Noveboracense Grout, Bryologist, July, 1900. Soil in swamp, Valley Stream.

B. oxycladon (Brid.) J. & S. Forest Park.

Bryhnia Novae-Angliae (Sulliv. & Lesq.) Grout. Common in swamps on Long Island.

Eurhynchium strigosum var. *praecox* (Hedw.) Husnot. On soil, Prospect Park.

Climacium Kindbergii (R. & C.) Grout. Common on sticks and hummocks in swamps of Long Island.

Pylaisia Schimperi R. & C. Bark of apple trees, Cold Spring.

Pteridophyta

Dryopteris simulata Davenp. Long Island, *Hulst.*

Equisetum hyemale L. Salt Meadows, Flushing Creek. New Lots, *Brainerd.*

E. sylvaticum L. Glen Cove, *Brainerd.*

Lycopodium lucidulum Michx. Not infrequent in the cool swamps of Long Island.

Spermatophyta

Potamogeton crispus L. Cold Spring Harbor, *Hulst.*

Scirpus caespitosus L. Reported in Dr. Jelliffe's list, but undoubtedly an error.

Quercus prinoides Willd. Wading River, *Miller.*

Rumex Patientiae L. Brooklyn, Forbells, *Hulst.*

R. persicarioides L. Montauk Point, *Hulst.*

Chenopodium Boscianum Moq. Rockaway, *Hulst.*

Amaranthus crispus (Lesp. & Thev.) Braun. Kings County, *Calverly.*

Lychnis Coronaria (L.) Desv. Hicksville, *Hulst.*

Ranunculus hispidus Michx. Common in open woods.

R. septentrionalis Poir. Queens County, *Calverly.*

Papaver dubium L. In fields. Oyster Bay, *Hall.*

Alliaria Alliaria (L.) Britton. Flatbush, Woodhaven. Collector unknown.

Cardamine Pennsylvanica Muhl. In stream near New Lots, *Brainerd.*

C. flexuosa With. Forbells, *Hulst.*

Rubus setosus Bigel. Jamaica, *Hulst.*

R. Baileyanus Britton. Sandy soil near shore, Rockaway.

Potentilla arguta Pursh. Springfield, *Hulst.*

P. intermedia L. Flushing, *Hulst.*

Amelanchier Botryapium (L.) DC. Low swampy thickets, Jamaica.

Lotus corniculatus L. On ballast, Brooklyn, *Hulst.*

Geranium Bicknellii Britton. Aqueduct, *Hulst.*

G. dissectum of Jelliffe's list is probably an error, as Dr. Hulst's specimen so labeled is *Erodium.*

Euphorbia maculata L. Brooklyn and Queens, *Calverly;* Long Island, *Brainerd.*

Hypericum prolificum L. Queens County, *Calverly.*

Elatine Americana (Pursh) Arn. Suffolk, *F. F. Allen;* Gowanus, *Brainerd.*

Lechea villosa Ell. Woodhaven and Cypress Hills, *Hulst.*

Viola Atlantica Britton. Abundant in moist meadows at Valley Stream.

Gaura biennis L. Long Id., *Zabriskie;* Queens County, *Calverly.*

Zizia cordata (Walt.) DC. Common in woods about Brooklyn.

Asclepias pulchra Ehrh. Forbells, *Hulst.*

Clinopodium vulgare L. Maspeth, *Hulst.*

Physalis heterophylla Nees. Moist railroad embankment, Far Rockaway.

Petunia parviflora Juss. On ballast, Brooklyn, *Hulst.*

Pedicularis lanceolata Michx. Forbells, *Hulst.*

Phryma Leptostachya L. Cypress Hills, *Hulst.*

Plantago aristata Michx. Cold Spring Harbor, *Hulst.*

P. media L. Brooklyn, *Hulst.*

Lonicera Xylosteum L. Flushing.

Leontodon nudicaule of Jelliffe's list is evidently based on a specimen of Dr. Hulst's so labeled which specimen is

Picris hieracioides L.

Lactuca sagittifolia Ell. Rockaway.

Crepis virens L. Richmond Hill, Cypress Hills, *Hulst.*

Xanthium Canadense Mill. The common form is var. *echinatum.*

Solidago juncea Ait. Cypress Hills, *Hulst.*

Hypochaeris radicata L. Cedarhurst.

Antennaria neglecta Greene. Common in sandy fields.

Senecio obovatus Muhl. Richmond Hill, *Hulst.*

Boys' High School, Brooklyn.

A KEY TO THE NORTH AMERICAN GENERA AND SPECIES OF THE HYGROPHOREAE.—I

By F. S. Earle

Key to the Genera

1. Spores black or dark brown. **A.** Gomphidius.
   Spores white or whitish. 2.

2. Usually parasitic on other agarics; basidiospores mostly replaced by chlamydospores. **B.** Nyctalis.
   Not parasitic on agarics; no chlamydospores. 3.

3. With a glutinous veil when young, leaving a more or less persistent annulus. **C.** Limacium.
   With no veil or annulus. **D.** Hygrophorus.

A. Key to the North American Species of Gomphidius

1. Pileus white or whitish. 2.
   Pileus some shade of red or brown. 3.
   Pileus dingy pink; lamellae whitish; stipe yellow. *G. flavipes* Pk.

2. Stipe yellow, shorter than the diameter of the pileus. *G. maculatus* (Scop.) Fr.
   Stipe white, longer than the diameter of the pileus. *G. furcatus* Pk.

3. Stipe concolorous (reddish or brownish). 4.
   Stipe at first white or whitish. 7.

4. Entire plant blackening in drying. *G. Oregonensis* Pk.
Plant not blackening, or only the gluten blackening. 5.

5. Plant not at all blackening; stipe more or less tomentose. 6
The gluten on pileus blackening; stipe pruinose at base. *G. vinicolor* Pk.

6. Large, 5–8 cm.; stipe longer than diameter of pileus, thinly brown-tomentose. *G. viscidus* (L.) Fr.
Smaller, 2–4 cm.; stipe shorter than diameter of pileus, yellow-tomentose below, glabrate above. *G Alabamensis* Earle.

7. Entire plant turning jet black in drying. *G. nigricans* Pk.
Plant not blackening. 8.

8. Pileus purplish brown; stipe white, yellow within. *G. glutinosus* (Schaeff.) Fr.
Pileus rose-color; stipe white, base and interior flesh-color. *G. roseus* Fr.

B. Key to the North American Species of Nyctalis

1. Parasitic on *Russula*, etc. *N. asterophora* Fr.

C. Key to the North American Species of Limacium

1. Pileus white or whitish, disc often colored. 2.
Pileus grayish yellow. *L. elegantulum* (Pk.)
Pileus with some shades of blue or violet. 7.
Pileus grayish brown or blackish brown. 8.

2. Pileus with more or less yellow on disc. 4.
Pileus with brownish disc and innate black fibrils. *L. virgatum* (Pk.) P. Henn.
Pileus white throughout. 3.

3. Spores irregular-sphaeroid, 5–6 μ. *L. eburneum* (Bull.) Schroet.
Spores ellipsoid, 6.5–7.5 $\mu \times$ 4–5 μ. *L. sordidum* (Pk.)

4. Lamellae stained greenish yellow with age; pileus covered with yellow gluten. *L. paludosum* (Pk.)
Lamellae becoming flesh-color; disc yellow or reddish. *L. flavo-discum* (Frost)
Lamellae white, unchanging. 5.

5. Pileus with deciduous yellow flecks on the disc and lamellae. *L. chrysodon* (Batsch) Schroet.
Pileus smooth, glutinous. 6.

6. Stipe white, farinose above. *L. luteum* (Johns.)
Stipe yellowish white, apex roughened. *L. Laurae* (Morg.) P. Henn.

7. Pileus bluish-alutaceous, lamellae darker. *L. caerulescens* (B. & C.)
Pileus violaceous when moist, paler when dry, lamellae violaceous. *L. subviolaceum* (Pk.)

8. Margin of lamellae entire; stipe white or brown-spotted. *L. fuligineum* (Frost) P. Henn.
Margin of lamellae erose; stipe pallid or brownish. *L. Morrisii* (Pk.)

SHORTER NOTES

A Saxifrage from the Queen Charlotte Islands and its Relatives.—Among the plants collected on the Queen Charlotte Islands by an expedition from the American Museum of Natural History and recently given to the New York Botanical Garden, is a specimen of a species of *Saxifraga* heretofore not represented in our herbaria. The plant belongs to the subgenus Arabidia which, prior to the acquisition of the plants referred to, was represented in North America by six species. These six species were equally divided between eastern and western North America. One species is common in the southern Alleghenies, two are found in Labrador and Greenland, while the remaining three are confined to the territory from the Rocky Mountains to the Pacific Ocean.

In the case of some of the species of this group the flowers are mainly replaced with bulblets, but the plant under consideration is destitute of bulblets and bears flowers about thrice the size of those borne on any of the other species. I shall name the species after the collector, Dr. C. F. Newcombe:

Saxifraga Newcombei.—Perennial, acaulescent, the caudex short. Leaves basal; blades spatulate, 4–8 cm. long, sessile, coarsely serrate-dentate above the middle, more or less glandular-pubescent and ciliate: scapes solitary, erect, 12–22 cm. tall, simple below the inflorescence, glandular-villous, corymbosely branched above: bracts similar to the leaves, but smaller and relatively less toothed: hypanthium nearly flat, 1.5–2 mm. broad: sepals ovate to oval, 3–5 mm. long, obtuse, glabrous or nearly so, usually purple, becoming reflexed: petals white, the three upper 7.5 mm. long, with lanceolate or oblong-lanceolate bimaculate blades, truncate or cordate at the base, and claws about 1 mm. long, the two lower petals with oblong or elliptic blades 8 mm. long: filaments subulate, 4 mm. long: fruit not seen.

Type specimen from the Queen Charlotte Islands, collected during the summer of 1901, in the herbarium of the New York Botanical Garden. It is most closely related to *Saxifraga ferruginea* Graham, but this species is smaller in every way, the flowers being barely one third as large, while the pubescence is rufous instead of pale as in *S. Newcombei.* J. K. Small

REVIEWS

MacDougal's Elementary Plant Physiology*

Dr. MacDougal's new elementary text-book of plant physiology s logically a revised edition of his Experimental Plant Physiology brought out in 1895, but a consideration of its contents shows that it is in fact a new book differing widely both in method of treatment and arrangement of subject matter from the earlier text. It is also to be said that the new book is an elementary manual adapted to the needs of subcollegiate grades and that in method of attack and sequence of the subject matter it is altogether different from the advanced text-book by the same author. The program of the contents is as follows: Chapter I. Introductory. II. Growth. III. Reproduction and Germination. IV. Exchanges and Movements of Liquids and Gases. V. Nutrition. VI. Respiration, Digestion and Fermentation. VII. Stimulation and Correlation.

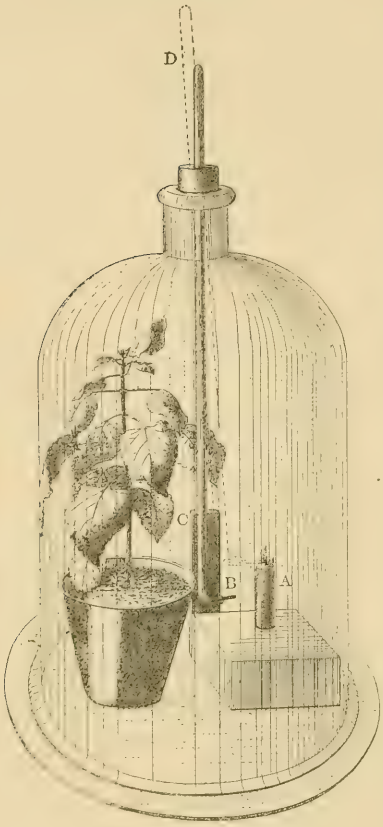


FIG. 64. Apparatus for demonstration of relation of plants to atmosphere. *A*, candle. *B*, match held in end of bent glass rod. *C*, sanded paper. *D*, position of glass rod when match is applied to candle.

These features are clearly presented by text, illustration and experiment. The text is so arranged that the student must gain self-reliance in performing the experiments, and by observation

* MacDougal, D. T. Elementary Plant Physiology. 8vo. Pp. i–xi + 138. London and New York, Longmans, Green and Co. 1902. $1.20.

and reasoning draw his own conclusions regarding the functions of organs and their adjustment to environment. The suggestions and appliances for conducting the various experiments will be found highly satisfactory. While the experiments are simple and easily prepared, attention is directed to the performance of each demonstration and to the proper construction of the apparatus. The author's device for the demonstration of the evolution of oxygen by green plants in sunlight and the relations of the plant to the air, as shown in Fig. 64, is a typical demonstration, and illustrates the author's care in the manipulations, and in setting forth scientifically complete experiments.

One of the most commendable features of the book is the continued emphasis given the more manifest structures and functions. The plant is constantly treated as a living organism responsive to the forces playing upon it and always showing a purposeful reaction. This feature is worthy of more than passing commendation. It not unfrequently happens that the student loses sight of the nature of the reaction in the stress laid upon its exact measurement by ordinary methods, and the efficiency of elementary courses is frequently seriously interfered with by the mathematical exactness required in the prosecution of the work.

It seems to us that the author is very happy in the introductory portion of the subject by the consideration of growth. While this procedure may violate the logical arrangement of the subject yet it plunges the student at once in the first day of his course into a series of observations and experiments easily made which are sure to awaken the keenest interest. It is, in fact, immaterial for the time being, whether he may be acquainted with the intimate structure of the growing organs or not. Ample opportunity for acquiring such information soon follows. The advantage derived from giving the student a chance to gain some accurate information of his own at first hand upon a familiar phase of the activity of the plant is obvious and the training received will enable him to appreciate better what might be termed the more fundamental portions of the subject in the work that follows.

C. C. Curtis.

PROCEEDINGS OF THE CLUB

Wednesday, February 26, 1902

This meeting was held at the Botanical Garden; Dr. Britton in the chair; 23 persons present.

Two new members were elected, Mr. Oscar Krause, 349 Seventh Avenue, New York City, and Dr. Vincent Baudendistel, Taurus P. O., West New York, N. J.

The first paper, by Dr. John K. Small, on North American Genera of the Cassiaceae, will soon appear in print.

Discussion followed regarding *Poinceana*, participated in by Dr. Britton, Dr. Underwood and Dr. Small.

The second paper by Dr. Arthur Hollick on the Flora of Provincetown, Mass., was accompanied by a series of maps, charts, views, and dried specimens. Dr. Hollick discussed the relation of this flora to the local geology, and remarked of Cape Cod that the older part from the Highlands of Truro southward consists of glacial drift; the recent part, through Provincetown to the north and west, consists of drifted sands, all postglacial, derived from the older portion and due to the general trend of the tides and currents northward. The result is to form a line of shoals along the coast now united into an outer beach; the space between this and the shore is now filling in and becoming swamp, and a new outer line of shoals is already forming.

Nothing larger now grows on the sand-dunes than small stunted pines and oaks; but Bradford's account indicates that in 1620 it was covered with large deciduous trees. Acts to prevent further cutting of timber were passed in 1720 and later. At present, the town of Provincetown, to prevent further loosening of the sand, forbids passing out of certain beaten paths in the wooded district. Hundreds of acres have been replanted by the state, the lands of Provincetown having been successively reserved as common property of the colony, province and state. It is only within a few years that the land in actual occupation in and near the town has been granted by the state to the occupants.

In reclaiming the sands, *Ammophila* or beach grass has been planted first, then bayberry, then *Pinus rigida*, the native pine of the region. Sand-loving species have since become well-established as an undergrowth, but the new growth shows no signs of ever equaling the original. The same is true on Block Island, where the original forest had become established while the island was connected with the mainland.

The sand flora is remarkable for the great areas closely covered with *Arctostaphylos Uva-Ursi;* this with *Rubus hispidus* and some plants of *Corema Conradii* is the chief means of forming the sand into turf.

The species collected in Provincetown numbered 94, among which *Corema Conradii* seems not to have been recorded from that town since Thoreau's visit in 1849.

The third paper was a note by Dr. A. P. Anderson on *Pachyma Cocos*—the Tuckahoe or Indian Bread. A specimen was exhibited, a mass about two feet long, made up of apparently annual sections indicating ten years' growth. Similar specimens have been found in the South along roots of oak and other trees, usually about two feet below the surface, obtained chiefly when clearing land of old stumps. Undoubtedly a fungus growth, and probably a sclerotium, it has never been seen to produce spores. The whole substance consists of a septated mycelium with abundance of white pectose. A species probably the same occurs in Europe; another in China has been used there for many centuries in medicine. Experiments by Dr. Anderson showed that portions separated from the roots of the host-plant were alive in the soil after a half year. Where the cortex of the *Pachyma* was removed it was renewed.

Rev. L. H. Lighthipe followed with a communication regarding Mr. C. L. Pollard's new species of violet—*Viola Angellae*. He exhibited a water color drawing showing the spring and summer forms of the plant. An excursion for its collection in Orange Mountains was suggested.

Edward S. Burgess,
Secretary.

Tuesday, March 11, 1902

The meeting was held at the College of Pharmacy ; 20 present ; Dr. Britton in the chair.

Three new members were elected: Miss Nina L. Marshall, Miss Ely's School, Riverside Drive, N. Y.; Miss Palmyre C. Clarke, N. Y. Botanical Garden ; Miss Lillie Angell, 19 Minton Place, Orange, N. J.

Seven resignations were accepted.

Professor Underwood reported a reply from the Syracuse Botanical Club indicating that the members would probably coöperate in the proposed July 4th excursion.

The first paper, by Edward S. Burgess, was on "Plant Illustration in the Middle Ages," being a portion of a contribution to the history of early botany soon to be printed among his Aster Studies. It was illustrated by examples from his library of early woodcuts intended to represent *Aster*, dated 1485, 1499, etc. (long anterior to the first adequate drawing of *Aster Amellus* L., that of Fuchs in 1542); and also examples of the value once put upon the vellum for manuscripts, showing an Italian manuscript dating perhaps from before 1200, in which torn vellum had been carefully mended before writing. He also exhibited a series of heliotypes, representing about 25 pages of unpublished mediaeval manuscript containing drawings of plants, and nearly as many pages more of decorated text ; photographed by Professor Giacosa, of Turin, to accompany his recent edition of certain of the Salernitan masters (*Magistri Salernitani*, Turin, 1901). Early plant figures long made it their one aim to show the outline. Chief attention was given to leaves, stem and branches. Flowers were less often and less successfully indicated. The characteristic *habit* of a plant, however, was often caught very perfectly. Figures were copied often with scrupulous care from one manuscript to another. Several causes tended, however, to their degeneration. Pliny charges the blame for the imperfect plant-figures of his time upon lack of skill of copyists. Some of the worst among later errors were those of copyists who were attempting copies of plants they had never seen ; as in early

Anglo-Saxon figures of *Aster* and other classic plants. In other copyists a desire for balance and symmetry overcame their fidelity to the original, so that they conventionalized their plants; as seen strongly in later Italian work exhibited, developed in the 14th century from the Salernitan school; and as retained in early printing, Italian woodcuts of 1499 inheriting the same tendency. A fourth source of error in plant-figures was the mediaeval love of the marvelous, so that many copyists outdid their text in depicting fictitious monstrosities; as in the 15th century pictures of mandrakes, Tartarian lamb, etc.

Some of the earliest plant-figures of which we know were those made by Cratevas, a Greek physician to Mithridates, about 100 B. C. Something of their character and form probably still survives to us in certain illustrated manuscripts of Dioscorides, of the fifth century, with figures evidently copied not from each other, but from an earlier common source. There is great need in the interests of the history of botany, that the project of publishing the figures of the Anician Vienna codex, now laid aside for nearly two centuries, should be revived and carried to successful issue.

In the discussion following this paper, Dr. Britton, Dr. Underwood, Professor Lloyd and Mr. Eugene Smith participated.

The second paper was by Mr. W. A. Cannon, entitled "Observations on the Structure of the ovular Integuments of *Dichelostemma capitatum*."

It was stated that the entire inner cell-wall of the outer integument and, also, the basal portion of the inner wall of the inner integument were cuticularized, and colored figures were shown, indicating the final resorption of the inner integument by the developing endosperm. The haustoria of the mistletoe penetrate the oak cortex by secreting a ferment which dissolves the neighboring cell-walls; excepting certain lignified cells which may become incorporated in the haustoria. So also in this liliaceous plant, better known to many as *Brodiaea*, the enzyme of the developing endosperm is unable to dissolve the cuticularized membrane of the integuments, a fact which appears to limit the extension of the endosperm.

Professor Lloyd in discussion suggested that different parts of the ovule may be able to secrete different kinds of enzymes, ready to attack different kinds of tissue simultaneously; at least three different enzymes have been obtained by mechanical means from the yeast-plant. In certain of the Rubiaceae, the formation of enzymes in the megaspore antedates fertilization; and that the pollen-tube develops an enzyme is well known.

The final contribution of the evening was by Dr. N. L. Britton, on the morphology of the flower of *Dichondra*, a plant commonly assigned to the Convolvulaceae. A specimen is now in full blossom under glass at the Botanical Garden, and its little rotate flowers which resemble those of a saxifrage are highly incongruous with those of the Convolvulaceae.

EDWARD S. BURGESS,
Secretary.

NEWS ITEMS

Professor Charles R. Barnes, of the University of Chicago, sailed from New York for Europe on March 22. He plans to be abroad for about nine months.

Professor F. S. Earle left New York on March 24 to spend two months in the mountains of New Mexico and western Texas, making collections for the New York Botanical Garden.

Mr. R. M. Harper has been appointed temporary aid in the herbarium of the U. S. National Museum. After a month he will proceed to Georgia to continue his field work on the flora of that state.

The moss collections of the late Mr. David A. Burnett, of Bradford, Pa., have been purchased by Mrs. Annie Morrill Smith, and presented to the museum of the Brooklyn Institute of Arts and Sciences.

Dr. D. T. MacDougal returned to New York on March 13 from a six weeks' visit to Arizona and the State of Sonora, Mexico, bringing back several large living specimens of *Cereus giganteus* and other living plants peculiar to that region for the conservatories of the New York Botanical Garden.

We learn from the *Stanford Alumnus* that Dr. Edwin Bingham Copeland, recently professor of botany in the West Virginia University, has been appointed instructor in botany in the Leland Stanford Junior University. Dr. Copeland, who is now engaged in research work at the University of Chicago, will begin his new duties in September.

The February number of the *American Naturalist* contains an interesting illustrated article by Mr. Ralph E. Gibbs on "*Phyllospadix* as a Beach-Builder." The fruit of this "eel-grass" of the Pacific coast has a curious device for attachment by means of which it anchors itself firmly to various species of the jointed coralline seaweeds.

A suggestive discussion of the affinities of certain anomalous genera commonly referred to the dicotyledons, begun by H. L. Lyon in a paper on the embryogeny of *Nelumbo*, published in the Minnesota Botanical Studies, has been continued by D. H. Campbell in the *American Naturalist* for January and by H. S. Conard in *Science* of February 21.

Publication 19 of the Botanical Society of America has recently been distributed. It includes a report of the seventh annual meeting held at Denver, August 27 and 28, 1901, and the annual list of officers, members, associates and patrons. The associates who were elected members at the last meeting were Hermann von Schrenk and Albert Fred Woods. The following accepted election as associates: Henry Chandler Cowles, David Griffiths, Duncan Starr Johnson, Thomas Henry Kearney, William Ashbrook Kellerman, George Thomas Moore, Roscoe Pound, Per Axel Rydberg and Jared Gage Smith.

In the announcement for the thirteenth season of the Biological Laboratory of the Brooklyn Institute of Arts and Sciences, located at Cold Spring Harbor, Long Island, the following items of botanical interest are noted. Professor D. S. Johnson, of Johns Hopkins University, is to be in charge of cryptogamic botany; Nelson F. Davis, Sc. M., of Bucknell University, in charge of bacteriology; S. M. Coulter, of Washington University, in charge of phanerogamic botany; Roy S. Richardson, High School, Brooklyn, in charge of nature study; Louise Brisbin

Dunn, A.M., of Columbia University, assistant in ecology; A. F. Blakeslee, A.M., of Harvard University, assistant in botany. Copies of the announcement may be obtained by addressing Professor Franklin W. Hooper, 502 Fulton St., Brooklyn, or the Director of the Laboratory, Dr. Charles B. Davenport, University of Chicago, Chicago, Ill.

The program of the spring lectures offered to the public by the New York Botanical Garden on Saturday afternoons is for this year as follows:

April 19th, "The Maples and other early-flowering Trees"; by Cornelius Van Brunt; April 26th, "Plant Life in the Sea," by Dr. Marshall A. Howe; May 3d, "Botanical Features of Porto Rico," by Prof. L. M. Underwood; May 10th, "Some Examples of Botany in its Relation to Geology," by Dr. Arthur Hollick; May 17th, "Wild Flowers, the Necessity for their Preservation," by Mr. Cornelius Van Brunt; May 24th, "The Cottons," by Dr. H. H. Rusby; May 31st, "Cactuses and Cactus-like Plants," by Dr. N. L. Britton; June 7th, "Favorite Flowers of Nations and Poets," by Professor E. S. Burgess; June 14th, "The Vegetation of American Deserts," by Dr. D. T. MacDougal.

The lectures will be illustrated by lantern-slides and otherwise, and will be delivered in the lecture hall of the Museum Building of the Garden, Bronx Park, at 4.30 o'clock. They will close in time for auditors to take the 5.42 train from the Bronx Park railway station, arriving at the Grand Central Station at 6.10.

The prizes from the income of the Olivia and Caroline Phelps Stokes Fund offered last January by the New York Botanical Garden for the best essays on the preservation of native plants have been awarded. The first prize, fifty dollars, was won by Dr. F. H. Knowlton, Washington, D. C.; the second, thirty dollars, by Miss Cora H. Clarke, Boston; the third, twenty dollars, by Dr. A. J. Grout, Brooklyn. The prize essays are being published in the current numbers of the *Journal of the New York Botanical Garden.*

OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

(1) BULLETIN

A monthly journal devoted to general botany. Vol. 28, published in 1901, contained 706 pages of text and 49 full page plates. Price $3.00 per annum. For Europe 14 shillings. Dulau & Co., 37 Soho Square, London, are agents for England.

Of former volumes, only 1–6 and 19–28 can be supplied entire from the stock in hand, but the completion of sets will be undertaken. Yearly volumes 1–5 (1870–1874), one dollar each. Vol. 6 (1875–1879), extending over five years, is furnished at the subscription price of five dollars. Vols. 19–27 (1882–1900) are furnished at the published price of two dollars each; Vol. 28, three dollars.

Single copies (30 cts.) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The MEMOIRS are published at irregular intervals. Volumes 1–7 and 9 are now completed and Nos. 1 and 2 of Vol. 8 and No. 1 of Vol. 11 have been issued. The subscription price is fixed at $3.00 per volume in advance. The numbers can also be purchased singly. A list of titles of the individual papers and of prices will be furnished on application.

(3) **The Preliminary Catalogue of Anthophyta and Pteridophyta** reported as growing within one hundred miles of New York, 1888. Price, $1.00.

Correspondence relating to the above publications should be addressed to

THE TORREY BOTANICAL CLUB
Columbia University
NEW YORK CITY

Vol. 2 May, 1902 No. 5

TORREYA

A Monthly Journal of Botanical Notes and News

EDITED FOR
THE TORREY BOTANICAL CLUB
BY
MARSHALL AVERY HOWE

JOHN TORREY, 1796–1873

CONTENTS

The Origin of Species by Mutation: D. T. MacDougal 65
The acaulescent Violets of Central New York: Homer D. House 68
Description of a new fossil Species of Chara: F. H. Knowlton 71
A Key to the North American Genera and Species of the Hygrophoreae—II: F. S. Earle 73
Shorter Notes
A sea-beach Helianthus from Florida: J. K. Small 74
Viola renifolia in the Pennsylvanian Alleghanies: Witmer Stone 75
The Name of a western Aquilegia: T. D. A. Cockerell 75
Proceedings of the Club: Edward S. Burgess 76
Program of Field Days of the Club, Season of 1902 77
News Items 79

Published for the Club
At North Queen Street, Lancaster, Pa.
by The New Era Printing Company

THE TORREY BOTANICAL CLUB

OFFICERS FOR 1902

President,

HON. ADDISON BROWN.

Vice-Presidents,

T. F. ALLEN, M.D. HENRY H. RUSBY, M.D.

Recording Secretary,

EDWARD S. BURGESS, PH.D.
Normal College, New York City.

Corresponding Secretary,

JOHN K. SMALL, PH.D.
Botanical Garden, Bronx Park, New York City.

Editor,

L. M. UNDERWOOD, Ph.D.,
Columbia University.

Treasurer,

FRANCIS E. LLOYD, A.M.
Columbia University.

Associate Editors,

NATHANIEL L. BRITTON, Ph.D. FRANCIS E. LLOYD, A.M.
CARLTON C. CURTIS, Ph.D. DANIEL T. MACDOUGAL, Ph.D.
MARSHALL A. HOWE, Ph.D. HERBERT M. RICHARDS, S.D.
ANNA MURRAY VAIL.

TORREYA is furnished to subscribers in the United States and Canada for one dollar per annum; single copies, fifteen cents. To subscribers elsewhere, five shillings, or the equivalent thereof. Postal or express money orders and drafts or personal checks on New York City banks are accepted in payment, but the rules of the New York Clearing House compel the request that ten cents be added to the amount of any other local checks that may be sent. Subscriptions are received only for full volumes, beginning with the January issue. Reprints will be furnished at cost prices. Subscriptions and remittances should be sent to Treasurer, Torrey Botanical Club, 41 North Queen St., Lancaster, Pa., or Columbia University, New York City.

Matter for publication should be addressed to

MARSHALL A. HOWE
New York Botanical Garden
Bronx Park, New York City

Vol. 2 No. 5

TORREYA

May, 1902

THE ORIGIN OF SPECIES BY MUTATION*

By D. T. MacDougal

The period which has elapsed since the presentation by Darwin and Wallace of the theory of the origin of species by natural selection has been most fruitful in the development of speculations as to the factors of evolution and the methods of inheritance and descent. The diversity of the evidence to be considered in connection with any phase of the subject is enormously great, and the majority of biologists interested in the subject have become engrossed in the argumentative presentation of the particular group of opinions to which they give a more or less prejudiced and partisan adherence after the manner of a debating society. During this period the investigators who most rationally held to the attitude that the methods of the origin of species were to be discovered by an examination of living forms themselves gave their attention to the comparative study of related forms or to tracing the phylogenetic phenomena displayed in the embryonic and juvenile stages of the organism.

Within the last decade the conviction has been growing among both botanists and zoölogists that polemics, the array of recapitulative facts offered by the organism in its younger stages, or the facts of comparative anatomy might not offer any convincing evidence of the manner by which the different species actually have arisen, although the results of these studies have been of enormous value in relation to other problems of biology.

In these latter days the tendency has become marked to rely more and more upon results obtained by experimental methods

* Given before the weekly Convention, N. Y. Botanical Garden, April 16 and 23, 1902.

[The exact date of publication of each issue of TORREYA is given in the succeeding number. Vol. 2, No. 4, comprising pages 49–64, was issued April 12, 1902.]

of research: instead of attempting to find an answer ready made for our questions we propound our question and set living things in action and seek our reply in their behavior under conditions which we may vary to suit our interrogation. It is obvious that the only way in which we may determine the method of origin of new species is to observe the formation of a species. The recent work of de Vries dealing with this subject is a record of the notable attempt made by him to obtain information upon the subject in this manner.*

De Vries' observations extend over seventeen years and the first volume of the great book in which his work is described deals with the origin of species by mutation, while the second now in preparation gives consideration solely to the subject of hybrids. According to de Vries species may arise by the following general modes:

1. Progressive species-formation by the construction or acquisition of new qualities.

2. Species-formation without the construction of new qualities, in which three cases may be distinguished.

A. Retrogressive species-formation by the lapse or latency of existing qualities, partly atavistic.

B. Digressive species-formation by the awakening or energizing of latent characters, partly in the formation of anomalous structures and partly in atavistic phenomena.

C. Hybridization.

De Vries assumes that any group of individuals which are independent, self-perpetuating and sufficiently distinct by taxonomic characters to meet the requirements of systematic botany constitutes a species irrespective of origin, and in the consideration of his results the importance of his conclusions is not lessened materially whether the forms with which he has dealt are considered as species or varieties so long as they are shown to consist of distinct and independent individuals capable of transmitting certain characters which are assumed to be constant within the limits of ordinary fluctuating variation.

* De Vries, H. Die Mutationstheorie. Versuche und Beobachtungen über die Entstehung von Arten im Pflanzenreich. I. Die Entstehung der Arten durch Mutation. xii + 648 pp. *Pl. 1–8* + *f. 1–181.* 1901.

It is needless to say that it would be difficult to undertake any experimental investigations involving the consideration of the status of species without running counter to the convictions and prejudices of a considerable number of systematists. Indeed, but few botanists are prepared to assign specific rank to any individual or group of individuals which have been observed to descend from a group of forms constituting a separate species. A somewhat more considerable number accept self-perpetuating hybrids as species, although it is doubtful whether this attitude may become universal. To this greater majority of systematists then the entire matter of origin of species by sports, single variations, or by mutation is entirely out of court. Single variations or sports are known to occur, however, and new species have suddenly appeared in many well-authenticated instances as the records of the last two hundred years show, and the possibility that many of the commonest forms around us may have originated in this very manner should make even the rashest thoughtful and willing to give the evidence an impartial examination.

It will be of interest to recall the origin of *Chelidonium laciniatum* and *Capsella Heegeri* Solms in this connection, the history of which began nearly three hundred years apart. Sprenger, an apothecary in Heidelberg, discovered in his medicinal garden in which *Chelidonium majus* was cultivated a new form of *Chelidonium* with divided leaves and laciniate petals. Specimens were submitted to a number of botanists at that time to whom it was unknown. The new species was found to be self-sustaining and in repeated cultural tests has shown no tendency to revert to *C. majus*. Furthermore, during the next three centuries it has never been seen except in gardens or in localities where it had clearly escaped from cultivation. Evidence of such conclusiveness would be held worth a human life in criminal proceedings in a court of law. A new species of *Capsella* was found by Professor Heeger at Landau in 1897 which apparently arose from a culture of *Capsella Bursa-pastoris*. This species was so distinct as to be assigned to the genus *Camelina* upon a first examination by Solms-Laubach.* Later, however, its true position was found.

* Solms-Laubach. Crucifereenstudien. Bot. Zeitung, 58 : 167. 1900.

This species has not been found in any collection of herbarium specimens and has not been reported from any other locality. The possibility is not absolutely excluded that the species may not be an old one, or may indeed be a hybrid between *Capsella* and another genus, yet so skilful an observer as Solms is disposed to believe it a new species originating by recent mutation from *C. Bursa-pastoris.* It has been found constant in its characters and self-sustaining so far. Numerous other instances of accidental observation might be cited but it will be profitable to pass at once to the cultural experiments of de Vries.

(*To be continued.*)

THE ACAULESCENT VIOLETS OF CENTRAL NEW YORK

By Homer D. House

Viola palmata L. Sp. Pl. 933. 1753.

V. palmata var. a. *vulgaris* Ell. Bot. S. C. & Ga. **1**: 300. 1817.

V. palmata var. b. *fragrans* Ell. *l. c.*

V. cucullata var. *palmata* A. Gray, Man. 28. 1867 [ed. 5].

Not common in central New York. The entire-leaved forms are some seasons more abundant than the forms with palmately divided leaves. The two forms are always found associated in this region. The entire-leaved variety I shall designate as:

Viola palmata asarifolia (Pursh).

V. asarifolia Pursh, Fl. Am. Sept. 732. 1814.

V. palmata sororia Pollard, Bot. Gaz. **26**: 332. 1898. Not *V. sororia* Willd. Hort. Berol. 1. *pl. 72.* 1806. Perhaps *V. sororia* Willd. Enum. 263. 1809, and of Le Conte, Schweinitz, Nuttall, etc.

Mr. C. L. Pollard refers the entire-leaved forms of *Viola palmata* to Willdenow's *V. sororia.* I am not familiar with the reference Mr. Pollard gives to Willdenow's *sororia*, viz., Enum. 263. 1809. I am, however, familiar with his use of the name in

his Hortus Berolensis, 1 : *pl. 72.* 1806, and excepting the flowers, which are poorly figured, both the description and figure represent a violet perfectly distinct and not to be confused with any entire-leaved *palmata.* The entire-leaved variety of *V. palmata* is distinguished from the next by its more erect and stiffer habit, leaves ovate to hastate-reniform with nearly truncate bases, and rather short defiexed cleistogenes.

VIOLA SORORIA Willd. Hort. Berol. 1 : *pl. 72.* 1806. Not Enum. 263. 1809. Not Pursh nor LeConte.

V. villosa var. *cordifolia* Nutt. Gen. 1 : 148. 1818.

V. cordifolia Schweinitz, Sill. Journ. 5 : 62. 1822.

V. nodosa Greene, Pittonia, 4 : 296. 1901. In part.

A very common violet in central New York, preferring rather dry but rich soil in woods or upland meadows, common along shady roadsides. It bears no resemblance to any entire-leaved forms of *palmata.* Willdenow does not state that his type was from Pennsylvania ; but if it was, which is very probable, it must have come from Muhlenberg, his correspondent there. At any rate, the species seems to have been familiar to the early botanists of Pennsylvania. Darlington describes it in his Flora Cestrica, 144. 1837, and adds the observation, " Leaves 1–2 inches long, mostly orbicular and subreniform, sometimes cordate and rather acute, sprinkled with rigid hairs, especially on the upper surface," etc. In the herbarium of the New York Botanical Garden is a specimen labeled by Darlington " *V. sororia,*" which agrees with specimens of my gathering in central New York. In the same place are specimens labeled as follows :

" *V. sororia* Willd. (*V. villosa* Walt. *β cordifolia* Nutt.) Unio itiner, in civitate Ohio, 1837, FRANK."

These specimens also agree with the central New York plant, and Dr. Britton tells me that with Mr. Bicknell, he has often collected this violet in Pennsylvania and is inclined to believe that it is Willdenow's *sororia.* It is evident, then, that the name *sororia* is to be connected with a plant of smaller size than *V. palmata* with more lax appearance of foliage, more softly pubescent leaves of softer and thinner texture. The leaves are never hastate reniform in shape, but have almost always a deep sinus or are at

least cordate with margins crenate or crenate-serrate. Cleistogamous flowers on simply horizontal peduncles.

VIOLA CUCULLATA Ait. Hort. Kew. 316. *pl. 12.* 1789.

V. palmata var. *cucullata* A. Gray, Bot. Gaz. **11**: 254. 1886.

The common "bog-meadow" violet of this region, with pale green foliage, cucullate leaves, and slender cleistogamous flowers on slender, erect peduncles.

VIOLA PAPILIONACEA Pursh, Fl. Am. **1**: 173. 1814.

V. obliqua Britton & Brown, Ill. Fl. **2**: 447. 1897. Not Hill, Hort. Kew. 316. *pl. 12.* 1769.

V. communis Pollard, Bot. Gaz. **26**: 326. 1898.

A violet of moist or low meadows and shady situations about dwellings; not rare, but until recently confused with *V. obliqua* and *V. cucullata.*

VIOLA OBLIQUA Hill, Hort. Kew. 316. *pl. 12.* 1769. Not *V. obliqua* Britton & Brown, Ill. Fl. **2**: 447. 1897.

V. affinis LeConte, Ann. N. Y. Lyc. **2**: 138. 1828.

Not a rare violet in swamps and wet meadows. The description in Britton's Manual of the Northern States and Canada applies well to the central New York form.

VIOLA CRENULATA Greene, Pittonia, **4**: 295. 1901.

A small, tufted, bog-meadow violet with small crenate, glabrous leaves on short petioles; flowering scapes greatly exceeding the leaves, the flowers pale-violet. Resembling *V. cucullata* in its foliage and habitat, but differing from it in its tufted appearance and cleistogamous flowers on very short deflexed or at least horizontal peduncles.

VIOLA ODORATA L. Sp. Pl. 934. 1753.

Introduced and rather common.

VIOLA ROTUNDIFOLIA Michx. Fl. Bor. Am. **2**: 150. 1803.

Not common in central New York. I have collected specimens in Herkimer county and have seen specimens collected in Madison county. Reported from the vicinity of Syracuse.

VIOLA SELKIRKII Pursh; Goldie, Edinb. Phil. Journ. **6**: 324. 1822.

Locally abundant in Herkimer, Oneida, Madison and Onon-

daga counties. Preferring mossy rocks in damp, shady ravines.

VIOLA BLANDA Willd. Hort. Berol. *pl. 24.* 1806.

VIOLA LECONTEANA Don, Gen. Syst. 1: 324. 1831. Britton, Man. 1049. 1901.

V. amoena LeConte, Ann. N. Y. Lyc. 2: 144. 1825. Not *V. amoena* T. F. Forst.; Symons, Syn. 198. 1798.

V. blanda var. *palustriformis* A. Gray, Bot. Gaz. 11: 255. 1886.

V. blanda amoena (LeConte) B.S.P. Prel. Cat. Anth. and Pterid. 6. 1888.

Viola alsophila Greene, Pittonia, 4: 7. 1899.

Rarely found in Herkimer county. Long Branch, Onondaga county.

VIOLA RENIFOLIA A. Gray, Proc. Am. Acad. 8: 288. 1870.

V. blanda renifolia A. Gray, Bot. Gaz. 11: 255. 1886.

VIOLA LANCEOLATA L. Sp. Pl. 934. 1753.

Only a few specimens of *V. lanceolata* have been collected along the edge of a swamp near Syracuse, and so far as I know this is the only record of its being found in this region.

SYRACUSE, N. Y., March 1, 1902.

DESCRIPTION OF A NEW FOSSIL SPECIES OF CHARA

BY F. H. KNOWLTON

Some weeks ago, by the kindness of Professor T. D. A. Cockerell, of East Las Vegas, New Mexico, I was informed that certain fluviatile deposits of Pleistocene age exposed in that vicinity contained great numbers of *Chara* "fruits." A few days since I received from Miss Ada Springer, a student of Professor Cockerell's, a box containing a considerable quantity of this material. Accompanying it was a short description of the "fruits" and a drawing which is the basis of the one here presented.

As this species proves to be wholly unlike any fossil species previously described from this country I venture to describe it as new under the name :

Chara Springeræ

Fruit (sporostegium) elliptical-ovoid in shape, with rather broad point of attachment, and obtuse apex, nearly twice as long as broad (0.65 ± mm. × 0 40 mm.); number of spirals as observed in side view 12 or 13; cells even or somewhat furrowed, obscurely punctate.

The "fruits" are present in considerable numbers, but they are very fragile and difficult to remove. For this reason it is hard to measure them with any degree of accuracy, but approximately they are 0.65 to 0.70 mm. in long, and about 0.40 mm. in short, diameter.

This form is separated at once from *Chara compressa* Knowlton* by its shape, and from *C. Stantoni* Knowlton† by its size, shape and the character and direction of the spirals.

The exact locality whence these specimens came is Arroyo Pecos, Las Vegas, New Mexico. The beds contain other fragmentary plant remains as well as a number of interesting animal remains. Professor Cockerell has kindly supplied me with the following section of the Pleistocene beds at this locality:

Upper Zone.	Coarse Sand.	Land shells only, mostly Pupidæ.
Middle or Charcoal Zone.		2 or 3 distinct layers of charcoal or charred wood, with some not much charred (*Pinus?*). Great quantities of fresh water shells, especially *Physa humosa* and *Sphaerium magnum*. Various bones, including *Equus* with teeth agreeing with *E. Scottii* Gidley.
Lower or Clay Zone.	Clay.	Clay with *Chara* in great abundance. Leaves of *Salix? Pyramidula Hemphilli* var. is very common. Fresh water shells of several species not *Sphaerium magnum*.

Professor Cockerell also sent me a number of fragments of wood and leaves, but the latter are so small and so poorly preserved that it was not possible to make them out. It was suggested that they belong to *Salix* and it is not improbable that they should be so referred. No sections of the twigs were made, but they are evidently coniferous, and may well have belonged to *Pinus*.

U. S. National Museum, February 25, 1902.

* Bot. Gaz. 13: 156.

† Op. cit. 18: 141

A KEY TO THE NORTH AMERICAN GENERA AND SPECIES OF THE HYGROPHOREAE.—II

By F. S. Earle

D. Key to the North American Species of Hygrophorus

Pileus firm, moist, not viscid; lamellae distant, arcuate. Section Camarophyllus.
Pileus fragile, thin, viscid, rarely floccose, often bright-colored; lamellae soft. Section Hygrocybe.

Section Camarophyllus.

1. Lamellae long-decurrent.	2.
Lamellae ventricose, sinuate-arcuate or adnate.	6.
2. Pileus white.	3.
Pileus grayish-brown.	5.
3. Cespitose; stipe short, solid.	*H. stenophyllus* Mont.
Scattered; stipe stuffed or hollow.	4.
4. Stipe 5 cm. long; odor none.	*H. borealis* Pk.
Stipe shorter, 2–2.5 cm. long; odor like anise.	*H. pusillus* Pk.
5. Stipe white; lamellae darker with age.	*H. albipes* Pk.
Stipe brownish; lamellae white; pileus dark.	*H. nigridius* Pk.
6. Pileus pale lilac, grayish-white when dry.	*H. pallidus* Pk.
Pileus whitish, tinged with reddish-brown.	*H. sphaerosporus* Pk.

Section Hygrocybe

1. Lamellae decurrent, or sinuate with a decurrent tooth.	2.
Lamellae adnexed or somewhat free.	10.
2. Pileus pure white.	*H. purus* Pk.
Pileus yellow.	3.
Pileus orange.	5.
Pileus some shade of red.	7.
Pileus grayish-brown.	*H. amygdalinus* Pk.
3. Pileus small, 6–8 mm.	*H. parvulus* Pk.
Pileus larger, 1–3 cm.	4.
4. Pileus convex, umbilicate.	*H. nitidus* B. & C.
Pileus convex to plane, obtuse.	*H. ceraceus* (Wulf.) Fr.
5. Pileus glabrous.	*H. aurantiaco-luteus* B. & C.
Pileus squamulose.	6.
6. Lamellae decurrent, distant.	*H. c ntharellus* Schw.
Lamellae sinuate-decurrent, somewhat crowded.	*H. squamulosus* E. & E.
7. Pileus small, 1 cm. or less.	8.
Pileus larger, more than 1 cm.	9.

8. Pileus light red, becoming paler ; lamellae whitish but tinted. *H. minutulus* Pk.
Pileus sordid red, often spotted ; lamellae shining red. *H. congelatus* Pk.

9. Pileus rose color. *H. cantharellus roseus* Pk.
Pileus shining red becoming yellowish ; lamellae white. *H. speciosus* Pk.
Pileus cinnabar red ; lamellae and stipe cinnabar. *H. cinnabarinus* Schw.

10. Pileus some shade of yellow or orange (not red). 11.
Pileus some shade of red (sometimes becoming yellowish). 12.
Pileus green. *H. psittacinus* Fr.
Pileus some shade of brown. 14.

11. Pileus golden yellow ; lamellae yellow, the margins orange or purplish. *H. marginatus* Pk.
Pileus yellow with purplish disc ; lamellae rose-color or brown. *H. Ohiensis* Mont.
Pileus orange ; lamellae paler. *H. Ravenelii* B. & C.

12. Pileus blood red ; lamellae yellow ; stipe red, thin, pallid. *H. haematocephalus* B. & C.
Pileus red (sometimes yellowish). 13.

13. Pileus convex, obtuse, not blackening. *H. chlorophanus* Fr.
Pileus conical, acute, blackening when wet. *H. conicus* (Scop.) Fr.
Pileus campanulate, cuspidate. *H. cuspidatus* Pk.

14. Pileus gray, brown-spotted, lamellae white. *H. variolosus* Fr.
Pileus greenish or yellowish-brown, lamellae white or yellow. *H. immutabilis* Pk.

New York Botanical Garden.

SHORTER NOTES

A sea-beach Helianthus from Florida. — During the summers of 1896 and 1897, the Rev. L. H. Lighthipe collected specimens of an exceptionally succulent sunflower on the coast near San Pablo, east of Jacksonville, Florida. The plant has the floral characters of the genus *Helianthus*, but differs from all our previously known species in habit, especially in the fleshy tissues and the almost glabrous involucral bracts:

Helianthus carnosus.—Perennial, essentially glabrous, fleshy. Stem solitary, erect from a slightly inclined base, 3–7 dm. tall, simple: basal leaves with linear or oblong-linear blades 7–15 cm. long, these often accompanied by several shorter and relatively broader ones ; stem-leaves mainly alternate, the lower two or four opposite by pairs, the succeeding ones narrowly linear, all entire, sessile: flower-head solitary: outer bracts of

the involucre ovate, 7–10 mm. long, acute or slightly acuminate, sparingly ciliate especially below the middle, inner bracts 10–12 mm. long, contracted below the middle, ciliate above, slenderly acuminate: disk yellow: flowers numerous: bractlets 8–10 mm. long, acuminate: corolla 6–7 mm. long; lobes ovate: achenes slightly angled, 3–3.5 mm. long: pappus-scales lanceolate, longer than the achene.

In sand, San Pablo, Duval county, Florida.

Helianthus heterophyllus seems to be the nearest relative of *H. carnosus*, but the former species has firm tissues, broader basal leaves and is rigidly pubescent to the flower-head, including the narrower involucral bracts.

The type specimen, collected by Mr. Lighthipe July 27, 1897, no. 320, is in the herbarium of the New York Botanical Garden.

J. K. Small.

New York Botanical Garden.

Viola renifolia in the Pennsylvanian Alleghanies.—On July 18, 1901, I collected a specimen of *Viola renifolia* Gray on the damp rocky slopes bordering the headwaters of Loyalsock Creek at Shady Nook, Sullivan County, Pa., at an elevation of about 2100 feet. This region is notable for the large percentage of truly Canadian species of both plants and animals, so that the occurrence is by no means unexpected. As it has never been recorded from further south than New York, however, it seems desirable to call attention to this station.

Witmer Stone.

Academy of Natural Sciences, Philadelphia.

The Name of a western Aquilegia.—*Aquilegia Eastwoodiae* Rydb. Bull. Torrey Club, **29**: 146. 1902, is the *A. micrantha Mancosana* Eastw. Proc. Cal. Acad. Sci. III. **1**: 77. 1897, and if it is treated as a species, must be called **Aquilegia Mancosana**.

T. D. A. Cockerell.

East Las Vegas, New Mexico.

PROCEEDINGS OF THE CLUB

Wednesday, March 26, 1902

The meeting was held at the Botanical Garden; Dr. M. A. Howe in the chair, twenty-one persons present.

One election to active membership was made, that of Mr. Ivar Tidestrom, 129 East 24th Street, N. Y.

The first paper was by Dr. L. M. Underwood, entitled "Notes on *Goniopteris*." Distinguishing features of allied genera, found in the venation and in the form of the indusium, were illustrated by figures. Nine species were mentioned, chiefly of the West Indies; including *G. reptans* and *G. tetragona* of Florida, and species recently collected in Porto Rico and in St. Kitts.

The second paper was by Dr. M. A. Howe, under the title of "Notes on the Marine Flora of Nova Scotia and Newfoundland." Numerous examples were exhibited, illustrating especially the larger Phaeosporeae, including large rolls of dried *Laminaria*, rock-specimens bearing crustaceous species, and many others preserved in jars or by mounting on sheets. Among noteworthy species or forms found were *Fucus serratus* and a *Stypocaulon* at Pictou, this being the first collection of the genus *Stypocaulon* in North America. Examples were shown of *Laminaria longicruris* and *L. platymeris* from the Newfoundland coast, whence De la Pylaie first described them. Interesting specimens of *Agarum*, *Alaria*, *Porphyra*, *Gloiosiphonia*, etc., were exhibited; the *Agarum* from a deep tide-pool near Digby covered by 30 feet of water at high tide. Corallines attain great beauty in these northern waters, and with the attendant brown rockweeds and lustrous kelps lend great richness and diversity of color. The dulse gatherers were found to distinguish and prefer the dulse growing on *Laminaria* to that attached to rocks. Dulse gathering in some parts of Nova Scotia forms a business of considerable importance; the dried dulse is put up in barrels to be sold in Boston and latterly in New York.

A third communication by Dr. MacDougal consisted of the exhibition and discussion of a specimen of *Ephedra*, one of two species collected by him in his recent trip to Arizona. This re-

markable leafless relative of the conifers produces palisade cells along its stems instead of leaves. A cutting about three feet high was shown resembling Scotch-broom in its multitude of long green and brown branches.

Dr. MacDougal also exhibited a remarkable Sonoran plant, perhaps an *Ipomoea*, with large swollen discoid base about 15 inches in diameter to which short roots were still attached. He also collected there the tree-Ipomoea known as the *Palo Blanco*, on which deer browse; it bears a few flowers all the year round but the leaves disappear after the rainy season.

EDWARD S. BURGESS,
Secretary.

TUESDAY, APRIL 8, 1902

The meeting of April 8 failed on account of a storm of unusual severity, only one person besides the secretary being present.

E. S. BURGESS,
Secretary.

PROGRAM OF FIELD DAYS OF THE TORREY BOTANICAL CLUB, SEASON OF 1902

May 3.—Hudson Heights, N. J. Leave foot of Christopher Street at 2 p. m. At Hoboken take trolley to end of line. Excursion fare, 16 cents. Guide, Mr. Eugene Smith.

May 10.—Orange Mountain. Take Christopher Street Ferry to Hoboken, then the 12.50 train to Orange. Returning, leave Orange at 5.09 or 5.48 p. m. Excursion fare, 50 cents. Guide, Miss Angell, who will meet party at Orange.

May 17.—Arlington, Staten Island. Leave by Staten Island Ferry at 1.30 p. m. Excursion fare, 20 cents. Guide, Mr. Wm. T. Davis.

May 24.—Central Park, Long Island. Leave Long Island City at 11.10 a. m. Excursion fare, $1.25. Guide, Mr. McCallum.

Decoration Day Trip.—May 29, 30, etc. Port Jervis, N. Y. Leave foot of West 23d Street, by Erie Railroad on Thursday,

May 29 or forenoon of Friday, May 30. The Friday morning train will be met at the Port Jervis Station. Trains leave at 4.45 p. m., arriving at 7.31, or at 6.25 or 7.25 p. m.; the 9.10 a. m. train arrives at 12.05. Returning as desired. Excursion fare, $2.50. Guide, Dr. Britton.

June 7.—Rye, N. Y. Leave Grand Central Station, N. Y. N. H. & H. R. R. at 1 p. m. Returning, leave Rye at 6.30 p. m. Excursion fare, $1.00. Guide, Dr. Schoeney.

June 14.—South Orange, N. J. Leave by Christopher Street Ferry at 12.30 p. m. Returning, leave South Orange at 5.02 p. m. Excursion fare, about 60 cents. Guide, Mr. Manda.

June 21.—Moonachie, N. J. Leave by Christopher Street Ferry at 1.00 p. m. Take Rutherford trolley to Lieve's Road-House. Fare, 20 cents. Guide, Mr. Nash.

June 28.—Great Notch, N. J. Leave by Chambers Street Ferry at 1.30 p. m. Excursion fare, 75 cents. Guide, Mr. Kato.

Fourth of July Trip.—July 3–5. Syracuse, N. Y. In connection with the Syracuse Botanical Club. Visits will be made to the Jamesville Green Lakes, one of the few stations for the harts' tongue fern, and to other interesting localities in the vicinity. The D. L. & W. Railroad offers round trip rates to Syracuse at $11.00. Further details will be given in Torreya for June. Guide, Professor Underwood.

July 12.—Aqueduct, Long Island. Leave foot of East 34th Street at 1 p. m. Excursion fare, 50 cents. Guide, Mr. McCallum.

July 19.—Maplewood, N. J. Leave by Christopher Street Ferry at 12.50 p. m. Excursion fare, 65 cents. Guide, Mr. W. A. Smith.

July 26.—Dunwoodie, N. Y. Leave 155th Street and Eighth Avenue terminus of Sixth Avenue Elevated Road, at 1.35 p. m. Excursion fare, 40 cents. Guide, Miss Sanial.

August 2.—Great Island, N. J. Leave foot of Liberty Street at 1 p. m. for Elizabethport; change to train on Newark and Elizabethport Branch which will stop at Great Island. Buy ticket at New York for Elizabethport and at Elizabethport for Newark. Excursion fare, 60 cents. Guide, Dr. Rusby.

August 9.—Central Park, New York City. Meet at 106th Street and Fifth Avenue at 2 p. m. Guide, Dr. Schoeney.

August 16.—Grasmere, Staten Island. Leave foot of Whitehall Street at 1.30 p. m. Excursion fare, 20 cents. Guide, Miss Lawall.

August 23.—Fort Lee and Englewood, N. J. Leave by Fort Lee Ferry at 1.30 p. m. Excursion fare, 30 cents. Guide, Dr. Hommel.

August 30.—New York Botanical Garden. Leave Grand Central Station at 1.30 p. m. Guide will meet party at Bronx Park Station.

September 6.—Pelhamville, N. Y. Leave Grand Central Station at 1.30 p. m. Excursion fare, 60 cents. Guide, Mr. Ericson.

September 13.—Richmond, Staten Island. Leave foot of Whitehall Street by ferry at 1.30 p. m. Take Midland trolley to Richmond. Excursion fare, 20 cents. Guide, Miss Motts.

September 20.—Rockaway Park, Long Island. Leave Brooklyn Bridge at 1 p. m. Excursion fare, 30 cents. Guide, Mr. McCallum.

September 27.—Moonachie, N. J. Leave foot of Christopher Street by ferry at 1 p. m. Take Rutherford trolley to Lieve's Road-House. Excursion fare, 20 cents. Guide, Mr. Eugene Smith.

October 4.—Plainfield, N. J. Leave foot of Liberty Street by ferry at 10 a. m. Excursion fare, $1.10. Guide, Miss Noll.

NEWS ITEMS

F. V. Coville, N. L. Britton, Gifford Pinchot, and J. M. Macfarlane have been appointed advisers in botany for the Carnegie Institution.

Mr. G. V. Nash, head gardener of the New York Botanical Garden, is in Europe for the purpose of visiting and studying some of the botanical gardens of England and the Continent.

Miss Julia T. Emerson, who has been carrying on special mycological studies at the New York Botanical Garden, has been

appointed a temporary assistant in the botanical department of Purdue University.

An expedition under the leadership of Mr. O. F. Cook, of the United States Department of Agriculture, has recently visited Guatemala with the special aim of gathering information in regard to the rubber industry.

"A Monograph on any genus or group of Thallophytes" is a subject for which the Boston Society of Natural History offers one of its Walker Prizes for the year 1903. The prize offered for the best memoir is sixty dollars, though this may be increased to one hundred dollars for a memoir of marked merit at the discretion of the committee. A second prize not exceeding fifty dollars may also be awarded. Memoirs submitted in competition must be in the hands of the secretary of the Society on or before April 1, 1903.

Dr. Oliver R. Willis died on April 27th at his home in White Plains, N. Y., aged eighty-seven years. Most of Dr. Willis's life was devoted to teaching, and he was well known as the editor and reviser of Alphonso Wood's widely used botanical text-books. He was the author, also, of a "Catalogue of Plants growing without Cultivation in the State of New Jersey," a "Report of the Flora of Westchester County" [New York], and of "A Practical Flora for Schools and Colleges." Dr. Willis was one of the earlier members of the Torrey Botanical Club.

A private letter brings news of the death of George S. Jenman, F.L.S., who was doubtless the best informed of any person in the world in regard to the field study of the ferns of British tropical America. From 1873–1879 he was Superintendent of the Botanical Garden at Castleton, Jamaica, and since 1879 he had been Government Botanist of British Guiana and Superintendent of the Botanical Garden at Georgetown. Mr. Jenman described many new ferns, mostly in the *Gardener's Chronicle* and the *Journal of Botany*, and between 1890 and 1898 published a synoptical list of the ferns of Jamaica with full descriptions. He began also a conspectus of the ferns and fern-allies of the British West Indies and Guiana, of which five parts had been issued at the time of his death.

OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

(1) BULLETIN

A monthly journal devoted to general botany. Vol. 28, published in 1901, contained 706 pages of text and 49 full page plates. Price $3.00 per annum. For Europe 14 shillings. Dulau & Co., 37 Soho Square, London, are agents for England.

Of former volumes, only 1–6 and 19–28 can be supplied entire from the stock in hand, but the completion of sets will be undertaken. Yearly volumes 1–5 (1870–1874), one dollar each. Vol. 6 (1875–1879), extending over five years, is furnished at the subscription price of five dollars. Vols. 19–27 (1882–1900) are furnished at the published price of two dollars each; Vol. 28, three dollars.

Single copies (30 cts.) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The MEMOIRS are published at irregular intervals. Volumes 1–7 and 9 are now completed and Nos. 1 and 2 of Vol. 8 and No. 1 of Vol. 11 have been issued. The subscription price is fixed at $3.00 per volume in advance. The numbers can also be purchased singly. A list of titles of the individual papers and of prices will be furnished on application.

(3) **The Preliminary Catalogue of Anthophyta and Pteridophyta** reported as growing within one hundred miles of New York, 1888. Price, $1.00.

Correspondence relating to the above publications should be addressed to

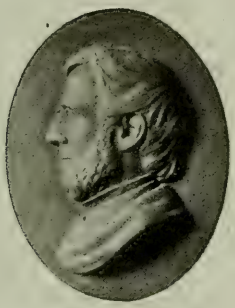
THE TORREY BOTANICAL CLUB
Columbia University
NEW YORK CITY

Vol. 2 June, 1902 No. 6

TORREYA

A Monthly Journal of Botanical Notes and News

EDITED FOR
THE TORREY BOTANICAL CLUB
BY
MARSHALL AVERY HOWE



JOHN TORREY, 1796–1873

CONTENTS

The Origin of Species by Mutation (*continued*): D. T. MacDougal..... 81
Our yellow Lady's-Slippers: P. A. Rydberg..... 84
The Bracket Fungi: L. M. Underwood..... 87
Shorter Notes
An interesting Irregularity in a Rose Flower: Francis E. Lloyd..... 90
Notes on a Long Island Moss: E. G. Britton..... 91
Proceedings of the Club: S. H. Burnham..... 92
Fourth of July Excursion of the Club..... 93
News Items..... 94

Published for the Club
At North Queen Street, Lancaster, Pa.
by The New Era Printing Company

THE TORREY BOTANICAL CLUB

OFFICERS FOR 1902

President,

HON. ADDISON BROWN.

Vice-Presidents,

T. F. ALLEN, M.D. HENRY H. RUSBY, M.D.

Recording Secretary,

EDWARD S. BURGESS, PH.D.
Normal College, New York City.

Corresponding Secretary,

JOHN K. SMALL, PH.D.
Botanical Garden, Bronx Park, New York City.

Editor,

L. M. UNDERWOOD, Ph.D.,
Columbia University.

Treasurer,

FRANCIS E. LLOYD, A.M.
Columbia University.

Associate Editors,

NATHANIEL L. BRITTON, Ph.D. FRANCIS E. LLOYD, A.M.
CARLTON C. CURTIS, Ph.D. DANIEL T. MACDOUGAL, Ph.D.
MARSHALL A. HOWE, Ph.D. HERBERT M. RICHARDS, S.D.
ANNA MURRAY VAIL.

TORREYA is furnished to subscribers in the United States and Canada for one dollar per annum; single copies, fifteen cents. To subscribers elsewhere, five shillings, or the equivalent thereof. Postal or express money orders and drafts or personal checks on New York City banks are accepted in payment, but the rules of the New York Clearing House compel the request that ten cents be added to the amount of any other local checks that may be sent. Subscriptions are received only for full volumes, beginning with the January issue. Reprints will be furnished at cost prices. Subscriptions and remittances should be sent to Treasurer, Torrey Botanical Club, 41 North Queen St., Lancaster, Pa., or Columbia University, New York City.

Matter for publication should be addressed to

MARSHALL A. HOWE
New York Botanical Garden
Bronx Park, New York City

Vol. 2 No. 6

TORREYA

June, 1902

THE ORIGIN OF SPECIES BY MUTATION *

By D. T. MacDougal

As a result of previous studies, de Vries was led to believe that species with a tendency to form monstrosities would be most likely to offer opportunities for securing evidence of the origin of new species by mutations or discontinuous variations. A thorough inspection of promising forms around Amsterdam in Holland was begun in 1886 and carried on for several years, during which period more than a hundred species were brought under cultivation, only one of which was found useful for observations upon mutations.

The plant in question—*Onagra biennis* (L.) Scop. [*Oenothera Lamarckiana*]—had escaped from cultivation in this locality in 1875 and was represented by several hundred examples in an old potato field. The rapid multiplication of the individuals had been accompanied by many divergences from typical forms inclusive of ascidia and fasciations, and while many were annuals, others were clearly biennial and a few were triennials. In 1887, a number of individuals representing two forms so distinct from *O. biennis* as to constitute new elementary species were found in the multitude of individuals which were examined. The exact origin of the new types, which were named *Oenothera brevistylis* and *Oe. laevifolia*, could not of course be determined, but both were found to be constant from seeds; furthermore, no examples of similar forms could be found in the principal herbaria. The occurrence of the two forms in question was not conclusive evidence in itself but they served to bring the interest and enthu-

* Continued from page 68.

[The exact date of publication of each issue of TORREYA is given in the succeeding number. Vol. 2, No. 5, comprising pages 65–80, was issued May 14, 1902.]

siasm of the investigator to the highest pitch and induced him to plan a series of observations lasting through the following fourteen years, which entailed an enormous amount of tedious mechanical work.

The experimental investigations which followed were organized with an attention to detail that left nothing to chance and reduced the sources of error to a minimum. Without recounting all of the various features of the technique employed it will suffice to say that most rigid methods of isolation of specimens and regulation of pollination were used, a fact that adds much value to the results which were achieved.

The culture of the main species was carried through successive seasons from absolutely pure crops of seeds, and the derivative forms were cared for in the same manner. *Onagra biennis* was found to be in a state of mutation and to reproduce every year of the experimental tests a number of forms which might be designated as constituting new species. Nine species were thus found to spring from *O. biennis*, being designated as *gigas*, *albida*, *oblonga*, *rubrinervis*, *nanella*, *lata*, *scintillans*, *elliptica*, *leptocarpa*, *brevistylis* and *laevifolia*. Mutants or derived species also were found to be in a state of mutation to some extent, and *laevifolia* gave rise to *spathulata* in addition to some of the forms derived from the parent type. *O. lata* in a similar manner gave rise to *sublinearis* and *subovata* in addition to some of the forms also derived from the parent type. The following table will

A Group of Derivatives from *O. biennis*

Generation.	Name of Species																	
	gigas.		*albida.*		*oblonga.*		*rubrinervis.*		*biennis.*		*nanella.*		*lata.*		*scintillans.*			
VIII. 1899			5	—	1	—	0	—	1700	—	21							
VII. 1898					9	—	0	—	3000	—	11							
VI. 1897			11	—	29	—	3	—	1800	—	9	—	5	—	1			
V. 1896			25	—	135	—	20	—	8000	—	49	—	142	—	6			
IV. 1895	1	—	15	—	176	—	8	—	14000	—	60	—	73	—	1			
III. 1890–91							1	—	10000	—	3	—	3					
II. 1888–89									15000	—	5	—	5					
I. 1886–87									9									

illustrate the frequence and manner of occurrence of the mutants derived from pure seed cultures of *Onagra biennis* (*Oenothera Lamarckiana*) in a series extending from 1886 to 1899.

In the genealogical table shown above, seeds from the nine specimens of the first generation produced 15,000 of the parent type, 5 of *nanella* and 5 of *lata*. Seeds from some of the 15,000 produced a crop consisting of 10,000 *biennis*, 3 *nanella*, 3 *lata* and 1 *rubrinervis*. The succeeding generations were obtained in the same manner.

It is to be seen from the above table that in the series of cultures outlined above, embracing seven generations of seedlings, about 800 of the 50,000, or a little more than 1.5% of the entire number, were mutants or forms sufficiently divergent from the normal to be designated as new species. The parent type produced some of the new species every year it was under observation but by no means in the same proportion or profuseness, and it seems very probable that no plant will exhibit the tendency to produce mutants in greater degree than the one which has been selected for these notable experiments. It is also to be noted that the new species have by no means the strength and general virility of the parent type, and that the few individuals representing some of the new species in any community would have but little chance of survival in the struggle for existence with the thousands of their fellows of the parent type. When isolated, however, and relieved from the fiercer competition met under natural conditions, the majority were independent constant types. *O. scintillans*, *O. sublinearis* and *O. elliptica* were classed by de Vries as inconstant forms, while *O. lata* is sterile so far as the examples yet examined show.

A discussion of the facts given above could hardly be made without calling up the question at once as to the systematic value of the forms designated as species. The new species which suddenly originate do not differ so widely as an apple from a pear, or as a pine from a spruce; only in a few of the species are their general features strikingly divergent from the parent type. Yet a careful examination will show that differences are present and important, relating to size and aspect of the shoot, shape,

color and surfaces of the leaves, and size and form of the fruits. Some of the new species are separable in the seedling stage when three or four leaves have been formed, the rosette presenting a characteristic picture. De Vries suggests that the mutants or species derived by mutations in his experiments are quite as clearly separable as the species recognized in the currently accepted classifications of the oaks, hieraciums, or cochlearias.

(*To be continued.*)

OUR YELLOW LADY'S-SLIPPERS

By P. A. Rydberg

Some time ago I received a letter from Mr. Oakes Ames, of North Easton, Mass., which contained, among other matters, the following lines: "While looking over your revision of the Orchidaceae in Dr. Britton's 'Flora of the Northern States and Canada' (1901), I noticed that your key for the genus *Cypripedium* gives as a characteristic of *C. pubescens* (*hirsutum*) a pale yellow lip, flattened vertically, and as a characteristic of *Cypripedium parviflorum*, a bright yellow lip, flattened laterally. Have you found in working up your material that the case is reversed after all, and that Hooker, Gray and others were confused in their ideas?"

Although I revised the manuscript of the Orchidaceae for Dr. Britton's Manual, I did not find anything in the treatment of *Cypripedium* that I thought needed a change, but left that genus practically as Dr. Britton had it in the "Illustrated Flora." I added in this case the differences in the flattening of the lip, which character had been used here at the Garden. My understanding of the two species was, however, the same as that of Dr. Britton and I had no idea that Hooker, Gray or others had any other understanding. I thought, therefore, that the difference between the characteristics given by them and by us was more apparent than real and that it depended upon a different interpretation of terms. I, therefore, wrote to Mr. Ames, explaining my use of the words "vertically" and "laterally" flattened. By *vertically flattened*, I mean such a flattening as would be produced by a pressure from *above* and *below*, the

greatest expansion, therefore, being lateral, and by a *lateral* flattening I mean such a flattening as would be produced by a *lateral* pressure, the greatest expansion being vertical. I also remarked that one of the most prominent of the American botanists now living understands by these terms exactly the reverse.

From another letter from Mr. Ames I find that he has interpreted the terms in the meaning in which Dr. Britton and I used them. A little closer study of Hooker's and Gray's descriptions made me see that Mr. Ames was correct in claiming that they understood the two species differently from us. Where is the trouble? As the results of my attempts to answer this question may be of general interest, I give them to the readers of TORREYA, hoping that they will kindly help in throwing light upon certain unknown facts concerning the yellow lady's-slippers.

The large yellow lady's-slipper, *Cypripedium hirsutum* of the Illustrated Flora and Britton's Manual, I have seen twice in the living state, once many years ago in Michigan and once in New York. As I know it, the lip is low and broad, *i. e.*, flattened vertically. *Cypripedium pubescens* was described by Willdenow in his Species Plantarum, 4: 143. 1805. He afterward published an excellent figure in his Hortus Berolinensis, 1: *pl. 13*. This figure shows the low and broad lip, and shows that it is the same as the plant described in Britton's Manual as *Cypripedium hirsutum* Mill. Miller has no plate, but there is no doubt in my mind that his *Cypripedium hirsutum* is the same as Willdenow's *C. pubescens*. Of the latter there is also a fine illustration in Barton's Flora, 3: *pl. 74*. This also shows the broad lip. The figure published in Sweet's English Flower Garden, *pl. 71*, does not belong to this species, but to what I have regarded as *Cypripedium parviflorum*.

The specimens of *C. hirsutum* or *C. pubescens* in our herbaria apparently all have a broad lip, so far as one can judge from pressed specimens.

The small yellow lady's-slipper I have not seen in the living state in the east; but the plant that has gone under that name in the Black Hills of South Dakota and in the Rocky Mountains is well known to me. In this the lip is taller and narrower, *i. e.*,

somewhat compressed laterally. In all eastern specimens with small flowers in our herbaria, except one from Wisconsin, the lip seems to be like those from the Rocky Mountain region. The first plate I turned to of *C. parviflorum* was that in Curtis's Botanical Magazine, **23**: *pl. 911*. This has the narrow high lip characteristic of the plant that I have held as *C. parviflorum* and which was published under that name in Britton's Manual. Turning to the Kew Index, I find that this plate is referred by Mr. Jackson to *C. pubescens*. It is evidently the same as *C. pubescens* of Sweet's English Flower Garden, mentioned above, but surely not the same as that of Willdenow's Hortus Berolinensis, which must be regarded as authentic. The same plant is also figured in Redouté's Les Liliacées, **1**: *pl. 20*. 1802, under the name of *C. flavescens*.

So far my interpretations seemed to have been correct, but now comes the trouble. I turned to the original publication of *C. parviflorum* Salisb. in the Transactions of the Linnean Society, **1**: 77. Salisbury has there a figure of the flower with a very broad and low lip, closely resembling Willdenow's figure of *C. pubescens*. *C. parviflorum* is compared with *C. Calceolus* of Europe and described and figured as having much smaller flowers than that species. It may be remarked that *C. Calceolus* scarcely has as large flowers as our *C. pubescens* and consequently the true *C. parviflorum* should not have larger flowers than *C. passerinum* of the far north and much smaller flowers than either of the two yellow lady's-slippers known by me.

The result of my investigations are in short as follows:

1. That *C. hirsutum* Mill. (*C. pubescens* Willd.) has been rightly understood by Dr. Britton and me, and wrongly so by the English botanists and by Gray.

2. That either do we have three species of yellow lady's-slippers, one large and one small-flowered, both with vertically flattened lip, and a third medium-sized one with laterally flattened lip; or else was *C. parviflorum* Salisb. a small-flowered form of *C. hirsutum*.

3. In either case, the one with laterally flattened lip is neither *C. pubescens* nor *C. parviflorum*.

4. If there are three species their names and synonyms would be as follows:

C. HIRSUTUM Mill. Gard. Dict. ed. 8. no. 3. 1768 (also of Britton's Manual); *C. pubescens* Willd. Sp. Pl. **4**: 143. 1805; Hortus Berolinensis, **1**: *pl. 13*; Barton's Flora, **3**: *pl. 74*.

C. FLAVESCENS Redouté, Lil. **1**: *pl. 20*. 1802; *C. parviflorum* Sims, Bot. Mag. **23**: 911. 1806 (also of Britton's Manual); *C. pubescens* Sweet, Engl. Flower Garden, **1**: *pl. 71*. 1823 (also of Gray's Manual).

C. PARVIFLORUM Salisb. Trans. Linn. Soc. **1**: 77. *pl. 2. f. 2.* 1791 (probably also of Gray's Manual).

As I have never seen the small yellow lady's-slipper of the east in the living state and do not know the form of its lip I ask the readers of TORREYA kindly to communicate to me any facts they may have and to watch our cypripediums during the coming seasons that the difficulty may be cleared. I would also be very thankful if I could get fresh material (especially flowers) of either of the species.

N. Y. BOTANICAL GARDEN.

THE BRACKET FUNGI

BY L. M. UNDERWOOD

At every season of the year numerous tough, woody, or leathery fungi will be found shelving out from stumps, fallen logs, tree trunks, or railroad ties. Most of these are plants belonging to the Agaricales and may represent any one of four families according as they bear on their under side lamellae, pores, spines, or merely smooth surfaces. Essentially they are formed alike, with the spore-bearing surfaces looking downward and with a roof or pileus formed of interlacing mycelium more or less compacted and sometimes hardened into a thick crust. One of the commonest in late spring or early summer is *Favolus*, with pores angular like honeycomb, a small round or reniform plant more commonly growing from hickory limbs though often on other species of wood. This is the only species of its genus

in the northern states. The species of *Polyporus* with small round pores are more numerous; some are confined to special kinds of wood while others do not seem to show any preference for the substratum on which they grow. Thus a species which has passed as *Polyporus lucidus*, but which is a wholly different species, grows only on the hemlock, and its polished surface looking as though smeared with shellac renders it very easy to distinguish. *P. betulinus*, with shapely form and pure white context, is confined to the white birch and is very abundant wherever its host is found. *P. rimosus*, with a cracked and fissured pileus, is common on the black locust (*Robinia*) from New York City to central Indiana and southward. In the fall the common willow (*Salix alba*) bears a rather fragrant species of a genus too closely allied to *Polyporus*, *Trametes suaveolens*. All these species and many others are confined to single kinds of trees and can readily be known by their peculiar habitat. Other genera of the pore-bearing fungi are also confined to single species of trees. Almost every old chestnut stump in the vicinity of New York City is more or less covered with the pilei of *Daedalea quercina*, with its thick corky texture and its coarse labyrinthine pores which almost form a link to lamellae. True lamellae are found in *Lenzites*, of which the common species with a brown context (*Lenzites sepiaria*) is confined to the wood of coniferous trees, while the common species with a white context (*Lenzites betulina*) is more widely distributed on the wood of deciduous trees and is everywhere common, its velvety pileus often covered with a growth of green algae.

Certain of the species of *Polyporus* are annual, forming a single layer of pores, though some of these occasionally build out a new mycelial surface beyond the borders of the old growth. Among these, three species are everywhere common, and all of them present themselves under a variety of forms. *Polyporus pergamenus*, with lacerate pores and thin pilei often tinted beautifully with purple when young, is the most widespread species, often covering the whole surface of a standing tree trunk or a recently fallen dead log. *P. versicolor*, still more protean in character, may be recognized by its thin context, white pores and

zonate pileus of varying but often bright tints. *P. hirsutus* may be known by its obtuse-walled dissepiments between the pores and its densely velvety pileus. These with *Daedalea unicolor*, with a similar but less hairy pileus, represent some of our most common species. Other species form successive layers of pores, often growing continuously for many years and sending out a new spore-bearing layer each year. These have been placed in the genus *Fomes* but this generic concept like the more embracing one, *Polyporus*, represents a conglomeration of generic types which careful study of our forms will some day enable us to separate and distinguish.

Among these, one of the most widely distributed is *P. leucophaeus*, which has long masqueraded in this country under an incorrect name as *P. applanatus;* this species does not seem to select the wood of any special tree for its substratum. Another species with layered pores very common on the yellow birch and the beech is the plant known as *Polyporus fomentarius*, although the exact limitation of this species is not yet clear. Another species common on trees of several species, especially in the Adirondacks, is *P. igniarius*, a black crustaceous species often reaching considerable size and an immense age as indicated by the number of layers.

We have a few species that are edible when in a young and cheesy condition. Among these is the brilliant-colored *P. sulfureus*, with its brilliant sulphur-yellow pores and its pretty pink-tinted pilei overlapping but connected at the base and often forming masses of many pounds' weight. Another common compound species is *P. frondosus*, which usually grows with us attached to the buried roots of old oaks.

We have also a few species with central stems. Among these the largest is *P. picipes*, recognized by its black-footed stem and red-brown pileus, often growing several together. A smaller species with a similar black foot, but with a pale yellowish-white pileus is *P. elegans*. A third wood-inhabiting species with a central pileus is found in late spring or early summer growing on all sorts of wood; this has a hairy fringe to its pileus and is known as *P. arcularius*. This species becomes rare northward, but has

been found as far northward as central New York. A late fall species (*P. brumalis*) with a dark brown pileus is more common northward than otherwise. All the above grow on wood. Other species grow on the ground like the brilliant brown somewhat shiny species which Professor Peck called *P. splendens;* this grows by the side of wood-roads quite commonly both north and south.

These are but a few of the common species that one is likely to meet in the woodland where there is more or less fallen timber. The species of bracket fungi are easy to collect and are readily preserved, the greatest trouble being from the fungus-eating beetles they often contain, but these can usually be destroyed by dipping the fungus into either benzene or gasolene, without injuring the specimen. In collecting, the habitat and host should be indicated and care should be taken to secure representative specimens which will clearly indicate habit of growth; if possible, plenty of them should be secured for study of variation. They can best be preserved in pasteboard boxes of assorted sizes, and while they form a bulky collection, they form an interesting one, and are usually more satisfactory for study than a collection of the fleshy agarics, however well preserved.

SHORTER NOTES

An interesting Irregularity in a Rose Flower.—Cultivated roses very frequently show various kinds of abnormalities, such as the development of sepals, or still more leaf-like organs where petals are usually to be expected, and other equally surprising occurrences. The case before us is one of these abnormal conditions which, though often observed, is of interest since it appears to offer pretty clear evidence as to the nature of the "hip" in the rose.

The case before us is the following: The specimen is a bud in which there are the usual five sepals, four of which are in normal position. The fifth, however, is inserted on a lower level on the surface of the calyx cup. The cup is, however, completely

formed *up to the level* of the bases of the remaining sepals. If now the rose "hip" is to be regarded as resulting from the concrescence of the sepals—in other words a calyx-tube—we would expect a hiatus in its side from the base of the oddly placed sepal upwards, which precisely does not occur. It would, however, not be impossible for the tissue from the sides of the hiatus to extend across the space and, by coalescing, obliterate it. We would then expect to find some evidence of disturbances in the direction of growth in the arrangement of the tissues, but this we do not find to be the case.

Regarding the hip as a receptacle (or torus)—that is, a vase-shaped expansion of the end of the axis—we would expect that under some conditions the sepals might appear at any point on its surface, and that the receptacle would be completely closed at the same time. This is the condition here found.

The condition above described appears to have the same morphological significance as that occasionally seen in the apple, in which a leaf or a very much shortened shoot, looking like a potato "eye," is sometimes found on the side of the fruit. Such a case as the former is mentioned by Bailey in his book, "Lessons With Plants" (p. 289). An apple with a shortened axis borne on its side was shown at a meeting of the Torrey Club some time ago. FRANCIS E. LLOYD.

NOTES ON A LONG ISLAND MOSS.—In the April number of TORREYA on page 50, in his Additions to the recorded Flora of Long Island, Dr. Grout listed *Raphidostegium admistum* (Sulliv.) as if it were a new combination. This had been published by Kindberg in the Bryineae of Europe and North America (1:64. 1897) as *R. admixtum* and specimens had been distributed in 1900 by Heller in his Plants of Porto Rico, nos. 4350 and 4496 as *R. admixtum* (Sulliv.) Ren. and Cardot. Dr. Grout has sent us specimens from Jamaica (Long Island) which have been compared with Wright's Cuban mosses no. 121—the co-type of *Hypnum admistum* Sulliv. The Long Island specimens are not referable to this species, but to *H. micans* Sw.

E. G. BRITTON.

PROCEEDINGS OF THE CLUB

Wednesday, April 30, 1902

The meeting was held at the Botanical Garden at 3:30 P. M.; 27 persons present; Rev. L. H. Lighthipe in the chair.

There were four elections to active membership: Mr. Elmer C. Hazard, Shrewsbury, N. J.; Mr. Ewen McIntyre, 303 West 74th St., New York; Professor Henrietta E. Hooker, Mt. Holyoke College, South Hadley, Mass.; and Miss Fannie F. Rabinowich, 22 Attorney St., New York.

Dr. Britton spoke of Dr. Oliver Willis's recent death and the following committee was appointed to draw up resolutions: Dr. Britton, President Brown and Dr. Rusby.

The first paper by Dr. C. C. Curtis, was on "Some Features connected with Transpiration." Transpiration may be illustrated by a fluctuating curve. The maximum of the curve is found in the forenoon. Transpiration can hardly be considered to be wholly a physical property. The volume of water given off by plants in the night is very considerable, and probably the stomata are never completely closed. It seems perfectly rational that the stomata are open, partly, in the dark and that some transpiration takes place. During the early morning hours, the amount of water given off is much more than in the afternoon, when the stomata have become accustomed to the light.

The second paper announced was by Dr. H. H. Rusby, on "A new Genus of Violaceae, with Remarks on other Genera." This was deferred on account of absence of the author.

The third paper, by Dr. H. M. Richards, was on "Turgor Changes in injured Tissues." It has been shown that the curve of respiration in injured plant tissues rises for a time and then falls off to the normal. The "wound fever," or rise-in-temperature curve is similar to that of respiration. Turgor changes apparently accompany these reactions towards injury. The onion was used for experiment, and the wounded and uninjured bulbs were placed in a saturated atmosphere. The normal turgor pressure in terms of KNO_3 solution is about 3.5 to 4%; after wounding this falls about 0.5%. As the healing goes on,

four or five days after the wounding, the turgor has increased again and the wounded and unwounded onions are practically the same in this respect. Carrot, beet and radish were also used.

Dr. MacDougal showed plants of *Monotropsis odorata* sent by Professor Johnson, of Johns Hopkins University. He also showed a basket made by the Pima Indians of Arizona, of *Typha*, *Martynia* and *Salix*, and exhibited the *ayal* or calabash fruit from Sonora, of economic importance, of genus *Crescentia*.

Miss Angell, of Plainfield, New Jersey, exhibited living plants of *Viola Angellae* in flower. When the plant is flowering the scapes exceed the leaves, but later in the season the leaves overtop the scapes.

S. H. Burnham,
Secretary pro tem.

Fourth of July Excursion of the Club

The Fourth of July excursion of the Torrey Club promises to be one of exceeding interest and profit. The main excursion will be to the Jamesville "green lakes," which are among the few stations of the hart's-tongue fern in America. It is planned to leave by carryalls from the postoffice at Syracuse at nine o'clock on the Fourth making an all-day trip in conjunction with the Syracuse Botanical Club. It is planned to visit both the green lakes and one or two interesting glens in the neighborhood. The green lakes are small ponds in the bottom of amphitheater-like hollows two hundred feet or more deep and said by the geologists to be the heads of ancient waterfalls. The lakes are very deep, and filled with cold water more or less impregnated with sulphur. The surrounding rock is of the corniferous and Helderberg limestone which overlie the Salina (salt) formation. Probably as large a variety of ferns grows about these lakes as in any limited area anywhere in the country, and mosses, fungi, lichens, and flowering plants grow in great profusion. On Saturday the fifth of July the club will visit the saline vegetation on the shores of Onondaga Lake, leaving the city by trolley cars. It is hoped that later excursions will be possible at the Kirkville green lakes and possibly Sylvan Beach on Oneida Lake. It is desirable that all who intend going with

the excursion notify the leader, L. M. Underwood, at Columbia University, as early as possible in order that proper accommodations may be provided.

NEWS ITEMS

Dr. B. M. Duggar, of the Bureau of Plant Industry, U. S. Department of Agriculture, has been elected professor of botany in the University of Missouri.

Professor Francis E. Lloyd lectured before the Biological Club of Princeton University, May 15, on "The Behavior of the Pollen-Tube in Spermatophytes."

Professor F. S. Earle returned to New York on May 27 from a collecting trip of two months, mostly spent in the Davis Mountains of western Texas and the Sacramento Mountains of eastern New Mexico.

Dr. W. A. Cannon, recently fellow in botany in Columbia University, will spend the summer in western North Carolina. A part of his time will be devoted to making collections for the New York Botanical Garden.

The eleventh session of the Hopkins Seaside Laboratory at Pacific Grove, California, began on June 9, the regular course of instruction closing July 19. Dr. Anstruther A. Lawson, assistant in botany at the Leland Stanford Junior University, has charge of the botanical courses.

The May number of the *Bulletin of the Torrey Botanical Club* includes three papers of interest to students of the fungi, viz., "The Nidulariaceae of North America" by V. S. White, illustrated by five plates; "Concerning some West American Fungi" by David Griffiths; and the conclusion of "Supplementary Notes on the Erysiphaceae" by E. S. Salmon, F. L. S.

Mr. Cyrus G. Pringle, one of the best known of living botanical collectors, has accepted an appointment as keeper of the herbarium of the University of Vermont, where his personal herbarium is soon to be deposited. The same institution has recently acquired on deposit the herbarium of the late C. C. Frost, which is especially rich in the cryptogamous plants of the Connecticut Valley.

The department of botany of the Marine Biological Laboratory at Woods Holl, Massachusetts, continues under the direction of Dr. Bradley Moore Davis, of the University of Chicago. The session for the summer of 1902 extends from July 2 to August 13. Dr. George T. Moore, Dr. Rodney H. True, Dr. Henry C. Cowles, Dr. Charles H. Shaw, Professor Andrew C. Moore, Mr. James J. Wolfe, and Miss Lillian G. MacRae are the other members of the botanical staff.

The Journal of Mycology, the publication of which was discontinued with volume 7 in 1894, is now revived by Dr. W. A. Kellerman, of the Ohio State University, Columbus, Ohio. This journal was established by Dr. Kellerman and Mr. J. B. Ellis in 1885 and later passed under the control of the Division of Vegetable Pathology of the United States Department of Agriculture, volumes 5–7 being published under the latter management. The journal will now be issued quarterly, the May number beginning volume 8.

The first regular meeting of the New York Naturalists' Club was held at the College of Pharmacy, 115 West 68th Street, on the evening of May 20. A constitution was adopted, and William L. Sherwood was elected president and Percy G. Doane, secretary and treasurer. The Naturalists' Club aims to be more popular and wider in its scope than the other scientific societies and clubs in New York City. At the June meeting a paper will be read upon the nature and classification of living objects, with an endeavor to show some of the relations of the larger groups.

The third annual meeting of the Horticultural Society of New York was held at the New York Botanical Garden on May 14 and 15. An exhibition of plants and cut flowers, with prizes open to all competitors, was a prominent feature of the meeting. Prizes to the amount of $425 were offered by the Botanical Garden and to the amount of $110 by the Horticultural Society. The June meeting of the society is to be held at the Botanical Garden on Wednesday and Thursday, the 11th and 12th, the main feature being an exhibition of roses and other flowering shrubs, peonies, small fruits and vegetables. Prizes

aggregating about $300 are offered. The Council of the Society announces that it has completed arrangements for an International Conference on Planting Breeding and Hybridization to be held in New York, September 30 to October 2, 1902.

"The Wild Flower Preservation Society of America" has recently been organized with the following officers: President, Mr. Frederick V. Coville, United States Department of Agriculture; vice-president, Dr. D. T. MacDougal, New York Botanical Garden; secretary, Mr. Charles Louis Pollard, United States National Museum; treasurer, Mrs. Carolyn W. Harris, 125 St. Marks Avenue, Brooklyn, New York; managers, Dr. L. H. Bailey, Cornell University; Mrs. N. L. Britton, New York Botanical Garden; Miss Alice Eastwood, California Academy of Sciences; Mr. E. L. Morris, Washington, D. C.; Mr. C. D. Beadle, Biltmore Herbarium; Mr. Joseph Crawford, Philadelphia, Pa.; Dr. C. F. Millspaugh, Field Columbian Museum; Mr. A. M. Read, Washington, D. C.; Dr. Charles E. Bessey, University of Nebraska; Mr. Walter Deane, Cambridge, Massachusetts; Dr. F. H. Knowlton, United States Geological Survey; Dr. William Trelease, Missouri Botanical Garden.

The annual dues are one dollar and each member is entitled to receive *The Plant World*, the official organ of the society, without additional charge. Under the auspices of the society a public lecture, illustrated by Van Brunt lantern slides, on "Some Wild Flowers in Need of Preservation" was delivered by Dr. N. L. Britton, May 22, before an audience of seven hundred, in the lecture hall of the U. S. National Museum, Washington, D. C.

Dr. William J. Gies, adjunct professor of physiological chemistry in Columbia University, has been appointed consulting chemist of the New York Botanical Garden.

OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

(1) BULLETIN

A monthly journal devoted to general botany. Vol. 28, published in 1901, contained 706 pages of text and 49 full page plates. Price $3.00 per annum. For Europe 14 shillings. Dulau & Co., 37 Soho Square, London, are agents for England.

Of former volumes, only 1–6 and 19–28 can be supplied entire from the stock in hand, but the completion of sets will be undertaken. Yearly volumes 1–5 (1870–1874), one dollar each. Vol. 6 (1875–1879), extending over five years, is furnished at the subscription price of five dollars. Vols. 19–27 (1882–1900) are furnished at the published price of two dollars each; Vol. 28, three dollars.

Single copies (30 cts.) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The MEMOIRS are published at irregular intervals. Volumes 1–7 and 9 are now completed and Nos. 1 and 2 of Vol. 8 and No. 1 of Vol. 11 have been issued. The subscription price is fixed at $3.00 per volume in advance. The numbers can also be purchased singly. A list of titles of the individual papers and of prices will be furnished on application.

(3) **The Preliminary Catalogue of Anthophyta and Pteridophyta** reported as growing within one hundred miles of New York, 1888. Price, $1.00.

Correspondence relating to the above publications should be addressed to

THE TORREY BOTANICAL CLUB
Columbia University
NEW YORK CITY

Vol. 2 July, 1902 No. 7

TORREYA

A Monthly Journal of Botanical Notes and News

EDITED FOR
THE TORREY BOTANICAL CLUB
BY
MARSHALL AVERY HOWE

JOHN TORREY, 1796–1873

CONTENTS

The Origin of Species by Mutation (*concluded*): D. T. MacDougal 97
A Key to the North American Species of Russula—I: F. S. Earle 101
Notes on the local Flora: Edward W. Berry 103
Notes on two parasitic Plants: S. B. Parish 105
Reviews
Lloyd's Comparative Embryology of the Rubiaceae: W. A. Cannon 106
Campbell's University Text-Book of Botany: Lucien M. Underwood 108
Proceedings of the Club: Edward S. Burgess 111
News Items 112

Published for the Club
At North Queen Street, Lancaster, Pa.
by The New Era Printing Company

THE TORREY BOTANICAL CLUB

OFFICERS FOR 1902

President,

HON. ADDISON BROWN.

Vice-Presidents,

T. F. ALLEN, M.D. HENRY H. RUSBY, M.D.

Recording Secretary,

EDWARD S. BURGESS, PH.D.
Normal College, New York City.

Corresponding Secretary,

JOHN K. SMALL, PH.D.
Botanical Garden, Bronx Park, New York City.

Editor,

L. M. UNDERWOOD, Ph.D.,
Columbia University.

Treasurer,

FRANCIS E. LLOYD, A.M.
Columbia University.

Associate Editors,

NATHANIEL L. BRITTON, Ph.D. FRANCIS E. LLOYD, A.M.
CARLTON C. CURTIS, Ph.D. DANIEL T. MACDOUGAL, Ph.D.
MARSHALL A. HOWE, Ph.D. HERBERT M. RICHARDS, S.D.
ANNA MURRAY VAIL.

TORREYA is furnished to subscribers in the United States and Canada for one dollar per annum; single copies, fifteen cents. To subscribers elsewhere, five shillings, or the equivalent thereof. Postal or express money orders and drafts or personal checks on New York City banks are accepted in payment, but the rules of the New York Clearing House compel the request that ten cents be added to the amount of any other local checks that may be sent. Subscriptions are received only for full volumes, beginning with the January issue. Reprints will be furnished at cost prices. Subscriptions and remittances should be sent to Treasurer, Torrey Botanical Club, 41 North Queen St., Lancaster, Pa., or Columbia University, New York City.

Matter for publication should be addressed to

MARSHALL A. HOWE
New York Botanical Garden
Bronx Park, New York City

Vol. 2 No. 7

TORREYA

July, 1902

THE ORIGIN OF SPECIES BY MUTATION*

By D. T. MacDougal

Admitting for the sake of the present discussion the validity of the results obtained by de Vries, the following general laws may be deduced from a consideration of the experimental observations recorded by him :

1. New elementary species may originate suddenly, without transition or intermediate forms between them and their immediate ancestors. The new species actually originate in the formation of the seeds, but are born, figuratively speaking, at the time of the germination of the seeds, and become recognizable in many instances as soon as the earlier leaves have unfolded.

2. The newly arisen species are constant from the moment of their origin, and a species is not to be considered as an arbitrary group but as consisting of a number of individuals conforming, within the limits of the fluctuating variations, to a sharply defined type.

3. The new forms arising in the experimental investigations were sufficiently divergent from the parents to be assigned specific rank, and might not be classed as varieties of the parent types.

4. The characters of the newly derived species show no resemblance to the individual variations exhibited by the parent type, being in fact qualitative rather than quantitative divergences. Special emphasis is to be laid upon this point, from which it would seem that species do not appear by gradual differentiations among plants growing wild in response to environmental stimuli,

*Continued from page 84.

[The exact date of publication of each issue of TORREYA is given in the succeeding number. Vol. 2, No. 6, comprising pages 81–96, was issued June 12, 1902.]

but originate suddenly without regard to their fitness for the conditions encountered.

5. As a further development of the last-named idea, the mutations by which new species arise are in themselves purposeless, and may differ from the parent in any particular, or, otherwise stated, mutation may take place in any given direction. Consequently, the greater number of the newly arisen types perish at once because of their pronounced unfitness for the conditions and competitions which they encounter, and do not reach a second generation. The surviving species must not only show a fitness for meeting the encroachments of existing forms, but must be anatomically and physiologically suitable for the environment. The number of mutants of any plant growing in a state of nature would usually be very much less than that obtained in the cultural operations described, by reason of the customary failure of the greater proportion of the crop of seeds to obtain germination conditions. It is of course possible that the exigencies of sudden erosions, or disturbances of the soil over small areas might occasionally furnish similar conditions to those under which *Onagra* mutated so abundantly.

6. The elementary species were found to arise in a number of individuals at the same time. The mutation from a parent type might occur in such manner that the new species would be formed in successive seasons in the same general manner.

7. Mutability occurs only at certain periods, and a species might continue existence indefinitely without giving rise to new forms.

In this last-named conclusion de Vries takes a position long held by Darwin that the variability of a species is independent of its environment and that the strengthening effect of use and weakening effect of disuse are in no wise to be considered as direct agents in the development of forms constituting new species.

The conceptions of de Vries as to the origin of species may be rightly understood only when his analysis of the character or consistency of a species is borne in mind. His interpretations of the facts lead him to the conclusion that the characters of an organism are made up of well-defined and separate units, or ele-

ments, and that these elements are associated in groups ; the same elements or groups of elements may, and supposedly do, recur in related species. The origin of a species by mutation would imply the substitution of a new elementary character, or quality, in the combinations, or groups, much after the same manner in which changes in the constitution of chemical bodies are effected.

It is these elementary units or characters which must be considered in the analysis of the qualities of a hybrid, and the proper application of the principles involved will, as de Vries asserts, afford an adequate explanation of the composite nature of hybrids. The forthcoming volume of this author upon the subject will be awaited with the greatest interest by all concerned with questions of descent and heredity.

From the reviews and discussions which have already been made of de Vries' papers it is to be seen that the greatest misunderstanding which may likely arise in the consideration of his results will be that founded on the error of confusing fluctuating variability and mutability. Individual variations, or fluctuating variations, may be caused by altered conditions of nutrition or other environmental factors, and when these conditions are applied and directed in gardening and agricultural operations they may give rise to the so-called improved races. Such variations are exhibited constantly, and in great number, and soon reach a maximum limit in any given direction, or in the development of any single quality, usually within a few generations, and the total departure from the original type is never sufficient to constitute an independent species, or true variety. Mutability on the other hand is a variation implying, and due to, the appearance of new qualities, or the disappearance of existing characters, or the rearrangement of elements, in such manner as to constitute new characters. Mutations are enormously rare in comparison with the fluctuating variations described above, and this very rarity has led to an underestimation of their value in the origin and development of species, according to de Vries' conclusions.

The writer is aware that the foregoing statements may be taken as a somewhat bold setting forth of the mutation theory, but still it is believed that the main contentions of de Vries are rightly

presented. Lack of space prevents a more critical and accurate delineation of the entire matter.

It is notable that a presentation of the importance of mutation or "heterogenesis" as a means of origin of new species has also been made recently by Korschinsky,* based upon historical evidence in which he presents a number of well-authenticated instances of mutations; other aspects of the subject have been brought out by Kölliker and Hartmann.

It will be of interest in this connection to cite a recent summary by von Wettstein of present knowledge of the method of origin of species as based upon information derived from the study of plants. This writer lays emphasis upon the fact that the significance of mutation must not be underestimated, and calls attention to the well-recognized fact that alterations in the elementary qualities of species have been demonstrated to take place only by hybridization and by heterogenesis (mutation). Other methods may exist but they lack the absolute proof which may be found in support of the two named. It is but fair to this writer to say, however, that he does not ascribe the origin of all species to any one cause, and that he lays great stress upon the fixation of adaptive characters, as well as upon hybridization and heterogenesis, as prominent among the factors to which new species owe their origin among plants in a state of nature.†

Since the above discussion was given to my colleagues before the weekly Botanical Convention, Professor de Vries has kindly sent me a supply of seeds of *Onagra biennis* (*Oenothera Lamarckiana*), the parent type used in his experimental cultures and also of five of the newly arisen species, viz: *O. brevistylis*, *O. gigas*, *O. lata*, *O. nanella* and *O. rubrinervis*. These were sown in the propagating houses of the New York Botanical Garden early in May and a fine crop of the different forms is already to be seen. These cultures will be most carefully observed, and the continued behavior of the parent type and derived forms noted, with respect

* Korschinsky, S. Heterogenesis und Evolution. Naturwiss. Wochenschrift, 14: 273. 1899. Also Flora, 89: 240–363. 1900.

† Wettstein, R. von. Der gegenwärtige Stand unserer Kenntnisse betreffend die Neubildung von Formen im Pflanzenreiche. Ber. Deut. Bot. Ges. 18: (184). 1900.

to further mutations, as well as to the constancy of their elementary characters.

New York Botanical Garden.

A KEY TO THE NORTH AMERICAN SPECIES OF RUSSULA.—I

By F. S. Earle

The Russulas are among our most abundant and attractive mushrooms. They are common everywhere in woodlands but seldom occur in open fields. The number of species is very great and many of them are conspicuous for their brilliant coloring. Bright reds, yellows, greens and purples are frequent among them, while other species appear in the less striking whites and browns. Many of the species are very hot and peppery to the taste, while a few are acrid or nauseous. This with their brilliant coloring has led to the belief that they are poisonous. In most cases the peppery taste disappears on cooking but in some the disagreeable flavors persist so as to render them unpalatable if not unwholesome. There is no evidence that any of the species are dangerously poisonous, like the deadly Amanitas, and it is probably prudent to eat of any of the species that are not unpalatable.

In studying the Russulas it is important to note carefully the characters of the lamellæ, whether equal or heterophyllous, forked or simple, whether the interspaces are veined or ribbed or smooth, and any changes in color either on maturity or when cut or injured. The taste and odor should also be carefully noted as also the color of the spores, whether white, bright yellow or ochraceous.

The first attempt at bringing together descriptions of our American species was by MacAdam (Journ. Myc. 5: 58–64, 135–141. 1889). This series of papers was unfortunately discontinued after twenty-five species had been described. McIlvaine and MacAdam (One Thousand American Fungi, 185–213. 1900) give descriptions of forty-five species. Peck in the Reports of the New York State Museum and in botanical journals has de-

scribed as new some twenty-seven species. In the following key a synopsis is given of seventy-seven species and varieties that have been reported from North America. It is probable that some species have been omitted, since the literature has not yet been exhaustively examined, and in some cases species are doubtless referred to the wrong section owing to imperfect descriptions. Any further notes or any corrections will be thankfully received by the writer.

Key to the Sections of the Genus

1. Lamellae equal; pileus with a separable pellicle. Sec. 5, Fragiles.
   Lamellae unequal, heterophyllous; pellicle adnate or none. 2.
2. Margin of pileus conspicuously striate. Sec. 4, Heterophyllae.
   Margin of pileus even, not striate. 3.
3. Pileus dry from the first, cuticle breaking areolately, scaly, pruinose, etc. Sec. 3, Rigidae.
   Pileus moist or viscid, smooth, cuticle not breaking. 4.
4. Lamellae conspicuously forking, slightly heterophyllous. Sec. 2, Furcatae.
   Lamellae conspicuously heterophyllous, seldom forking. Sec. 1, Compactae.

Key to the North American Species

Section 1, Compactae

1. Pileus white or pallid. 2.
   Pileus cream-color or tinted. 3.
   Pileus brown or fuliginous; lamellae darkening or drying. 4.
2. Lamellae distant; stipe 2–6 cm. *R. delica* Fr.
   Lamellae crowded; stipe 1–2 cm. *R. brevipes* Pk.
3. Lamellae and flesh changing to brown when wounded. *R. compacta* Frost.
   Lamellae and flesh unchanging. *R. cremoricolor* Earle.
4. Lamellae and flesh changing to reddish when wounded. *R. nigricans* (Bull.) Fr.
   Lamellae and flesh unchanging. *R. adusta* (Pers.) Fr.

Section 2, Furcatae

1. Pileus white, pallid or slightly tinted. 2.
   Pileus greenish or brownish green or olivaceous. 3.
   Pileus some shade of red, at least when young. 6.
2. Flesh blackening when wounded. *R. sordida* Pk.
   Flesh white, not blackening. *R. basifurcata* Pk.
3. Stipe brighter green than pileus. *R. viridipes* Bann & Pk.
   Stipe white or whitish. 4.

4.	Lamellae subdistant, thick.	*R. furcata* (Pers.) Fr.
	Lamellae crowded, narrow.	5.
5.	Lamellae often forking; pileus yellowish green, acrid.	*R. aeruginascens* Pk.
	Lamellae sometimes forking; pileus brownish green, mild.	*R. crustosa* Pk.
	Lamellae rarely forking; pileus olivaceous.	*R. olivascens* Fr.
6.	Pileus blood red; lamellae crowded, narrow.	*R. sanguinea* Fr.
	Pileus lighter, often pallid with age.	7.
7.	Lamellae subdistant, broad; taste mild.	*R. subdepallens* Pk.
	Lamellae crowded or subcrowded.	8.
8.	Taste mild.	*R. depallens* Fr.
	Taste acrid.	9.
9.	Pileus and lamellae spotted.	*R. sardonia* Fr.
	Pileus and lamellae not spotted.	*R. rosacea* Fr.

New York Botanical Garden.

NOTES ON THE LOCAL FLORA

By Edward W. Berry

While the following list contains no additions to the New Jersey flora, it is believed that the stations are, for the most part, new and worth recording, more especially as the rapid spread of suburban residences and manufacturing establishments in this section of the State is fast obliterating what beautiful bits of watercourse or swampland remain.

Eriophorum gracile Koch. Atlantic*: Hammonton.

Orontium aquaticum L. Passaic: near Passaic. Bergen: near Garfield.

Erythronium albidum Nutt. Bergen: near Garfield.

Salomonia commutata (R. & S.) Britton. Bergen: banks of Passaic River opposite Passaic.

Cypripedium parviflorum Salisb. Passaic: Great Notch. Bergen: Carlton Hill.

Castanea dentata (Marsh.) Borkh. Atlantic: Hammonton.

Aristolochia Serpentaria L. Bergen: near Garfield.

Silene Caroliniana Walt. Passaic: Great Notch.

* The name of the county is placed first, followed by the colon.

Magnolia Virginiana L. Bergen: swamp along Hackensack River.

Trollius laxus Salisb. Passaic: Clifton. Bergen: Garfield, Carlton Hill.

Coptis trifolia (L.) Salisb. Hudson: Secaucus swamps. Bergen: Paramus.

Cimicifuga racemosa (L.) Nutt. Passaic: Passaic, Great Notch, abundant.

Ranunculus delphinifolius Torr. Sussex: Lake Hopatcong. Bergen: Carlton Hill.

Ranunculus obtusiusculus Raf. Bergen: Moonachie.

Ranunculus pusillus Poir. Passaic: Passaic.

Ranunculus sceleratus L. Passaic: Passaic, Clifton. Bergen: Woodridge, Moonachie.

Batrachium trichophyllum (Chaix) Bossch. Passaic: near Passaic, abundant.

Caulophyllum thalictroides (L.) Michx. Sussex: Lake Hopatcong.

Lupinus perennis L. Bergen: near Lodi.

Euonymus Americanus L. Passaic: near Great Notch.

Viola rostrata Pursh. Passaic: Passaic.

Viola lanceolata L. Passaic: Passaic.

Viola primulaefolia L. Bergen: Wallington.

Viola rotundifolia Michx. Passaic: Passaic.

Clethra alnifolia L. Passaic: Passaic, Clifton.

Rhododendron maximum L. Bergen: swamp along Hackensack River, abundant.

Asclepias rubra L. Atlantic: Pleasant Mills.

Utricularia vulgaris L. Atlantic: Hammonton.

Utricularia inflata Walt. Atlantic: Absecon.

Utricularia clandestina Nutt. Atlantic: Hammonton.

Conopholis Americana (L. f.) Wallr. Passaic: Passaic, on white birch.

Valeriana officinalis L. Passaic: along Notch Road.

Adopogon Carolinianum (Walt.) Britt. Passaic: Great Notch.

Tragopogon pratensis L. Passaic: Passaic, abundant.

Tragopogon porrifolius L. Passaic: along road near Great Notch.

Sclerolepis uniflora (Walt.) Porter. Atlantic: near Hammonton.

Willugbaeya scandens (L.) Kuntze. Passaic: near Passaic.

Senecio obovatus Muhl. Sussex: Lake Hopatcong.

Passaic, N. J., April 1, 1902.

NOTES ON TWO PARASITIC PLANTS

By S. B. Parish

Cuscuta indecora Choisy.—It is stated by Britton and Brown that "indications of a small amount of coloring matter, possibly chlorophyll, have been observed in one species" of *Cuscuta*. To which species they refer I do not know, but I remember such a statement, made some years ago in the *Bulletin of the Torrey Botanical Club*, regarding *C. Gronovii*.

This spring I had the opportunity of observing a considerable number of seedlings of *C. indecora*. The seed must have been aggregated in some way, for the plantlets came up in tufts of twenty or more. They were some two inches in length, and not having found hosts were tangled together. Now what at once attracted the attention was that these tufts showed three distinct bands of color. For their lower third the stems were white and somewhat hyaline, indicating that the cell contents had been mostly absorbed. The next third had a very noticeable tint of light-green, possibly—may one not say probably—indicative of the presence of chlorophyll. The remaining third had the usual yellowish color of the species.

Phoradendron flavescens macrophyllum Engelm.—The books tell us that birds, eating the fruit of the mistletoe, distribute the seeds by their evacuations. Kerner it is, I think, who adds that as these are watery the heavier seeds are carried down to the under part of the stem of the host, so that the young parasite often makes its appearance in that situation.

These observations are probably true of *Viscum album*, the European mistletoe, but it seems to be different with *Phoradendron*

flavescens, its American analogue, at least here in southern California. Mistletoe is very abundant, and at the proper season one may find seeds glued on branches of trees, on fences and stones, in short, wherever birds alight. I have never seen any that had the appearance of having passed through the digestive tract of a bird. They seemed rather as if left by the bird in cleaning his bill or feet, to which they may have adhered while he was feeding. This is more probable from the fact that seldom do more than two or three seeds appear to have been deposited at one time. Young mistletoes usually, but not always, start from the upper half of the branch on which they grow.

Why *P. flavescens* should be leafy and *P. juniperinum* leafless, has been plausibly explained from the fact that the first species, growing on deciduous trees, needs leaves of its own during the resting period of its host, while the juniper mistletoe needs none since it grows on evergreens. This is a satisfactory explanation, but it evidently needs amendment to make it clear why *P. Bolleanum*, growing on junipers, should be leafy, while *P. Californicum*, which is parasitic on the mesquite and other deciduous hosts, is leafless.

San Bernardino, California.

REVIEWS

The Comparative Embryology of the Rubiaceae *

The second part of Professor Lloyd's study has recently appeared and forms a very valuable as well as interesting contribution to our knowledge of the Rubiaceae. In this paper there are studies of the following species: *Callipeltis Cucullaria*, *Sherardia arvensis*; several species of *Galium*, viz., *Aparine*, *recurvum*, *pilosum*, *Mollugo*, *verum*, *triflorum*, *tinctorum* and *Parisiense*; several species of *Asperula—azurea*, *galioides*, *montana*, *setosa*, and *tinctoria*; *Rubia tinctoria*; *Crucianella gilanica*, *C. macrostachya*, *C. herbacea*; *Diodia Virginiana*, and *D. teres*; *Richardsonia pilosa*; and *Houstonia coerulea* and *H. longifolia*.

* Memoirs of the Torrey Botanical Club, 8: 27–112. *pl.* 5–15. 15 F. 1902.

Since it is hardly possible in a short review to present in detail the results of this throughgoing study, I shall summarize only what are apparently the most important conclusions.

In all of the plants studied except *Houstonia* two ovules and one integument are present; *Houstonia* has many ovules and no integument, realizing the "nucellus nudus" of Schleiden. In the Spermacoceae, there is, in addition to the integument, an outgrowth which contains the vascular supply of the ovules and is the seat of a large number of excretory cells. This is termed the strophiole.

The archesporium, except in the Spermacoceae and Oldenlandeae, contains 7–15 macrospore mother-cells, and each macrospore mother-cell divides twice to form four spores, which are physiologically and morphologically equivalent, and any or all of which may undergo one division although the functional embryo-sac is derived from the middlemost of the group. In the Spermacoceae and Oldenlandeae there is but one macrospore mother-cell.

The embryo-sac presents some curious and interesting deviations from the usual conditions that obtain in the higher plants. The embryo-sac either develops where the macrospore is formed (*Houstonia* and *Richardsonia*), or it moves along the micropylar canal, and in extreme cases (as in *Asperula*) the mature embryo-sac may partly protrude from the end of the canal and come to lie between the integument and the pericarp.

As regards the antipodals, although invariably present, they vary greatly both as to function and number. Perhaps the most interesting of the antipodals described are those of *Callipeltis Cucullaria*, of which one is greatly elongated and acts as a haustorium, by the action of which the supernumerary macrospores are destroyed and their contents ingested and made available as food for the developing embryo-sac.

The young embryos of the Galieae are provided with haustorial outgrowths that project laterally from the suspensor. Their function as absorbers ceases as soon as the adjacent endosperm cells become filled with reserve food, and their walls become thickened to form a reserve cellulose.

An account is given (pp. 66–88) of the mitoses of the archesporium and embryo-sac, based mainly on a study of *Asperula montana*, *Crucianella macrostachya* and *C. gilanica*. The embryo-sac mother-cell contains a large number of coarse fibers which persist through the prophases of the first division and are regarded as currents of kinoplasm and not, therefore, as a rearrangement of the reticulum. As in the higher plants, the spindle is of multipolar origin, no centrosomes are present, and the maturation divisions are normal. In *Crucianella* the interesting discovery of ten as the reduced number of chromosomes was made.

The behavior of the pollen tube in *Diodia* and *Richardsonia* is given in much detail. After leaving the pistil the tube may make its way either between and in a direction at right angles to the columnar epidermal cells that are in the neighborhood of the micropyle (*Richardsonia pilosa* and *Diodia teres*), or, it may extend to the surface of the ovule and travel upon it to the micropyle (*Diodia Virginiana*). Professor Lloyd concludes that chemotropism is the important factor in determining the later direction of growth of the pollen tube, that the distribution of the irritant is a differential one, and, finally, he suggests that the synergidae or possibly the ovum may be the source of the stimulant. The pollen tube does not as a rule act unfavorably on the cells with which it comes into contact except in so far as injury may arise from the pressure that it may exert upon them.—W. A. CANNON.

A University Text-book of Botany*

With nearly 400 pages devoted to the botanical system out of a total of 550, the present work would seem to represent a work on systematic botany and it must be interpreted mainly from that standpoint, although it is written by one who has never been classed as a systematic botanist. The work as a text-book must most naturally be compared or contrasted with the most recent emanation from the Germans familiarly known in our laboratories as the "Bonn text-book," for it is evidently this work that the

*A University Text-Book of Botany, by Douglas Houghton Campbell, Ph.D. xv + 579 pp. *Pl. 1–15* + *f. 1–493*. New York, Macmillan & Co. (Price, $4.00.)

present volume aspires to replace. The relative space given in the two works to the various major divisions of the subject can be seen by a direct comparison :

	Campbell.	Bonn Text.
Introduction and General Morphology,	65	130
Physiology,	34	124
Botanical System,	395	271
Ecology,	35	
Distribution in time and space,	21	
Total pages,	550	525

Of necessity much of the work is a compilation from many sources but it seems strange that in following the systematic arrangement of Engler and Prantl there has not been more of an attempt to bring that work, which is already comparatively old in parts, at least up to the standard suggested by its own authors, even if the additions made by other workers were not considered. It is inexcusable, for instance, that the complex Helvellaceae should continue to stand next above the simple Exoascaceae, a blunder so patent that the incongruity was pointed out in the German text itself before its completion. Class and ordinal terminology follows a hap-hazard arrangement wholly at variance with the principles enunciated at Berlin itself, and generally accepted wherever the importance of a consistent terminology is recognized. Thus the author accepts Howe's class Anthocerotes as a coördinate group with the Hepaticae, but the name is changed to *class* Anthocerotales, thus improperly using a termination reserved for a group of ordinal rank alone.

The bibliographies at the close of the chapters are curious in their detail, and one is at a loss to know the *motif* in the selection of titles. On the one hand papers of comparative unimportance are freely cited, and on the other standard works are wholly omitted. It is hard to understand why a page should be wasted in a *university* text-book in citing the long list of recent elementary texts in botany both English and American, while among the 365 bibliographic citations from American botany no reference whatever is made to such classics as Torrey and Gray's Flora of North America or Harvey's Nereis. A bibliography of American lichens that omits all reference to the works of Edward Tucker-

man and yet cites Schneider's Guide is, to say the least, strangely askew in botanical perspective. More than once the same work is cited in different places under different titles and throughout there is lack of attention to minor details that distinguish a really valuable bibliography from a random selection of unassorted titles of papers. Accuracy in bibliographic citation is one of the characteristics of recent American botany, but in this work there is a relapse toward English inaccuracy which is far below the American standard.

No less curious are the titles of chapters where logical arrangement would be naturally expected in a systematic work, and where the student needs to have all the mechanical aids that are possible to a clear coördination of the subject. Chapter IV., for instance, is entitled "Classification" and that word occupies the headline of the right-hand page throughout the chapter, but only a page and a quarter of the chapter is devoted to the subject of "classification," where that word also appears as a subtitle or one of the subdivisions of itself, while the bulk of the chapter is devoted to the lowest groups of plants, mainly the schizophytes and the diatoms. Although the author includes both the bryophytes and the pteridophytes under the "Archegoniatae," Chapter VII. alone is headed "Archegoniatae" and treats only of bryophytes, while Chapters VIII. and IX. are headed "Pteridophyta" with no suggestion in the headlines of their relation to any other coördinate division. In a similar way the subtitles are a strange mixture of illogical sequence and lack of proper subordination. For example, in the chapter on the "Angiospermae," three fifths of which is not devoted to that subject but to one of its two divisions, the following subtitles appear in coördinated typography: "The Flower," "The Ovule," "The Antipodal Cells," "Pollination," "The Homologies of the Embryo-sac," "Germination," "The Leaf," "The Floral Leaves," "Structure of the Flower," "Classification of the Angiosperms."

The illustrations are not up to the standard of first-class American laboratories, many of them being sketchy and showing an unfinished appearance. In this field a student should have models set before him in the way of botanical illustration, at least of as

high a grade as would be required in a master's thesis. Some of the illustrations that are apparently redrawn from this and that author are frequently a good way "after" the originals.

The space devoted to certain important subjects like embryology is too meager, at least on its physiological side, and the whole chapter on physiology, besides being out of all proportion to the size of the work in its brevity, in some places becomes a mere catalogue of important topics with striking bold-face headlines and a few words of explanatory matter.

While the work has many good features that will readily commend themselves, it can by no means be taken to represent the standard of American botany of the present day. The subject of botany has become too broad to lie within the grasp of one man, and the ideal university text-book—still a dream of the future—must be the work of many specialists with the whole brought into coördination by one master mind whose botanical perspective is so clear-cut that the real relation of parts will form a consistent and logical whole. Even the phlegmatic Germans have reached this point and have set an example of this sort. It remains for Americans in the future to adopt and perfect the plan.

Lucien M. Underwood.

PROCEEDINGS OF THE CLUB

Tuesday, May 13, 1902

The meeting of May 13 was held at 8 p. m., at the College of Pharmacy; 18 persons present; Dr. H. H. Rusby in the chair.

The secretary reported a request from the Brooklyn Institute to print the Torrey Club's weekly program of excursions on the weekly program-ticket of the Institute. The Club voted its endorsement of this arrangement.

The treasurer asked for the appointment of a committee to report on the price of the Memoirs to members of the Club. As a committee the chair appointed the board of editors and the treasurer.

Dr. Underwood and others discussed the proposed Fourth of July excursion to the lakes near Jamesville, N. Y. With this it

is proposed to combine a visit to the halophytic flora of the Saline Salt Springs.

Two new members were elected: Mr. W. A. Cannon, Columbia University; Mrs. Emily Hitchcock Terry, Hubbard House, Northampton, Mass.

The scientific program was as follows: Margaret Slosson, "A Hybrid between *Asplenium platyneuron* and *Camptosorus rhizophyllus*"; Francis E. Lloyd, "Vivipary in *Podocarpus*" and "A new Method of displaying Herbarium Specimens."

These papers, which were illustrated with numerous drawings and specimens, will soon appear in print.

EDWARD S. BURGESS,
Secretary.

NEWS ITEMS

Mr. G. V. Nash, head gardener of the New York Botanical Garden, returned on June 14 from a visit to some of the botanical gardens of Europe. Arrangements for exchanges of living plants were made with various gardens.

Mr. Joseph E. Kirkwood, instructor in botany in Syracuse University, and Miss Winifred J. Robinson, instructor in Vassar College, are carrying on some special studies at the New York Botanical Garden during the summer vacation.

A prospectus of the new Sharon Biological Observatory at Sharon, Massachusetts, has recently been distributed. The plans of this institution, so far as developed, include the following: "(*A*) A preserve for native trees, wild flowers and other wild plants, and for wild animals such as insectivorous and game birds, rabbits, squirrels, fishes, frogs, etc.; (*B*) opportunities for experimental and field investigation in natural history, biology, etc.; (*C*) summer school of nature studies." The Observatory is at present a private undertaking on the part of the Director, Dr. George W. Field, and others connected with the Massachusetts Institute of Technology. The summer school opens on July 9. The botanical courses offered are under the direction of J. G. Jack, Samuel C. Prescott, and A. B. Seymour.

OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

(1) BULLETIN

A monthly journal devoted to general botany. Vol. 28, published in 1901, contained 706 pages of text and 49 full page plates. Price $3.00 per annum. For Europe 14 shillings. Dulau & Co., 37 Soho Square, London, are agents for England.

Of former volumes, only 1–6 and 19–28 can be supplied entire from the stock in hand, but the completion of sets will be undertaken. Yearly volumes 1–5 (1870–1874), one dollar each. Vol. 6 (1875–1879), extending over five years, is furnished at the subscription price of five dollars. Vols. 19–27 (1882–1900) are furnished at the published price of two dollars each; Vol. 28, three dollars.

Single copies (30 cts.) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The MEMOIRS are published at irregular intervals. Volumes 1–7 and 9 are now completed and Nos. 1 and 2 of Vol. 8 and No. 1 of Vol. 11 have been issued. The subscription price is fixed at $3.00 per volume in advance. The numbers can also be purchased singly. A list of titles of the individual papers and of prices will be furnished on application.

(3) **The Preliminary Catalogue of Anthophyta and Pteridophyta** reported as growing within one hundred miles of New York, 1888. Price, $1.00.

Correspondence relating to the above publications should be addressed to

THE TORREY BOTANICAL CLUB
Columbia University
NEW YORK CITY

Vol. 2 August, 1902 No. 8

TORREYA

A Monthly Journal of Botanical Notes and News

EDITED FOR
THE TORREY BOTANICAL CLUB
BY
MARSHALL AVERY HOWE

JOHN TORREY, 1796–1873

CONTENTS

Vivipary in Podocarpus: Francis E. Lloyd 113
A Key to the North American Species of Russula—II: F. S. Earle 117
A Note on the Vitality of the Spores of Marsilea: Marshall A. Howe 120
Shorter Notes
A new Hemizonia from California: LeRoy Abrams 122
An undescribed Species of Hy rophyllum: N. L. Britton 123
Notes on Verbena: Henry Eggert 123
Lunularia cruciata "in Fruit": Julia T. Shinn 124
Proceedings of the Club 125
News Items 126

Published for the Club
At North Queen Street, Lancaster, Pa.
by The New Era Printing Company

THE TORREY BOTANICAL CLUB

OFFICERS FOR 1902

President,

HON. ADDISON BROWN.

Vice-Presidents,

T. F. ALLEN, M.D. HENRY H. RUSBY, M.D.

Recording Secretary,

EDWARD S. BURGESS, PH.D.
Normal College, New York City.

Corresponding Secretary,

JOHN K. SMALL, PH.D.
Botanical Garden, Bronx Park, New York City.

Editor,

L. M. UNDERWOOD, Ph.D.,
Columbia University.

Treasurer,

FRANCIS E. LLOYD, A.M.
Columbia University.

Associate Editors,

NATHANIEL L. BRITTON, Ph.D. FRANCIS E. LLOYD, A.M.
CARLTON C. CURTIS, Ph.D. DANIEL T. MACDOUGAL, Ph.D.
MARSHALL A. HOWE, Ph.D. HERBERT M. RICHARDS, S.D.
ANNA MURRAY VAIL.

TORREYA is furnished to subscribers in the United States and Canada for one dollar per annum; single copies, fifteen cents. To subscribers elsewhere, five shillings, or the equivalent thereof. Postal or express money orders and drafts or personal checks on New York City banks are accepted in payment, but the rules of the New York Clearing House compel the request that ten cents be added to the amount of any other local checks that may be sent. Subscriptions are received only for full volumes, beginning with the January issue. Reprints will be furnished at cost prices. Subscriptions and remittances should be sent to Treasurer, Torrey Botanical Club, 41 North Queen St., Lancaster, Pa., or Columbia University, New York City.

Matter for publication should be addressed to

MARSHALL A. HOWE
New York Botanical Garden
Bronx Park, New York City

Vol. 2 No. 8

TORREYA

August, 1902

VIVIPARY IN PODOCARPUS *

By Francis E. Lloyd

An interesting case of vivipary, one which appears to be more or less widely known, but, nevertheless, unrecorded † is that which occurs in *Podocarpus Makoyi*. It is quite probable that the same thing occurs in some other species of the genus. During the past winter a specimen of this species some four feet in height has produced, in the conservatory of the New York Botanical Garden, an excellent crop of fruits, and these have, almost without exception, germinated, and this on the tree, so that the plant presented, for a greenhouse plant, a very unique and interesting appearance. A shoot, bearing a germinating seed, is shown in Fig. 1.

The ovules of *Podocarpus Makoyi* are produced laterally in the axils of the leaves. They are provided, as are all the Taxaceae, with a fleshy, aril-like organ, dark purple when ripe (*int. 2*, Fig. 2), which is generally regarded as an outer integument. Surmounting this is the glaucous green, oval body, consisting, when young, of nucellus and integument (inner integument, according to the terminology here used, *int. 1*, Fig. 2), which corresponds to the similar body deeply buried in the pit of a *Taxus* fruit. From this, however, it differs in the fact that in *Podocarpus* it comes into an anatropous position. The micropyle is then so placed as to lie against the fleshy outer integument (Fig. 2, *c*).

* Read at a meeting of the Torrey Botanical Club, May 13, 1902.

† I learn from Mr. K. Miyake that the phenomenon is, as would be expected, well known in Japan and has probably been described in Japanese; it has also been observed before in cultivation elsewhere.

[The exact date of publication of each issue of Torreya is given in the succeeding number. Vol. 2, No. 7, comprising pages 97–112 was issued July 1, 1902.]

When the fruit has arrived at maturity, the embryo (*e*, Fig. 2, *c*) then occupies a cylindrical cavity in the endosperm (*end*, Fig. 2, *c*) which, rich in food materials, occupies the whole space in the interior of the inner integument. The end of the radicle of the embryo then lies close to the micropyle, and it is at this stage in its development that, were it not for the viviparous habit, the seed would enter the resting condition. As it is, however, the embryo keeps up its growth, and very soon the

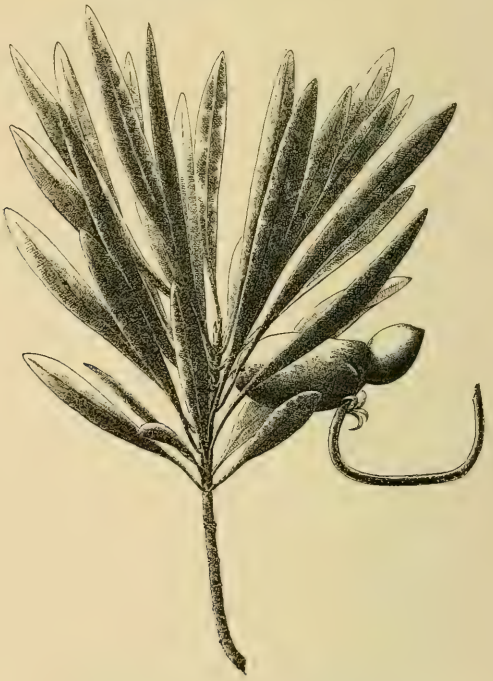


FIG. 1. A shoot of *Podocarpus Makoyi*, bearing a germinating seed.

root end of the embryo breaks through the micropyle. The relative position of the two regions of the ovule above distinguished, together with the positive geotropy of the root pole of the embryo, causes the radicle, and later the hypocotyl, to bend downwards. How far the geotropic stimulus affects the matter is however not clear, for, either on account of the weak response, or as a result of unequal growth on the two sides of

the hypocotyl, the axis continues its growth in a curve, so that, when the whole of the hypocotyl is exposed, it lies in the arc of a circle, approximately (Fig. 1, *h*; Fig. 2, *a*). The process of curving does not always cease even after the fruit falls from the tree, but continues as the seedlings lie upon the ground until, in many cases, the hypocotyl makes a complete loop. These curvatures are frequently fixed by growth so that in older seedlings the irregularities are still to be seen. The absence of geotropic response may be only apparent, inasmuch as growth is very slow, and the tissues of the exposed axis are rendered cumbersome by the load of food materials.

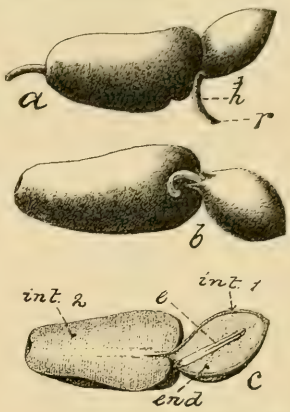


FIG. 2. *a*, lateral view of fruit during early stage of germination; *b*, dorsal view, and *c*, longitudinal section, of same; *e*, embryo, *end*, endosperm; *int. 1*, *int. 2*, inner and outer integuments; *h*, hypocotyl; *r*, radicle.

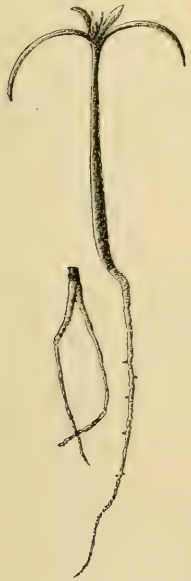


FIG. 3. A seedling, and the lower end of another showing two lateral roots.

The hypocotyl is, when developed, of that club shape (Fig. 3) characteristic of certain other viviparous plants, as the mangroves. It is very rich in food materials, especially starch, derived not alone from the endosperm but as a result of its own activity in starch-making. This is evident from the greater weight of the hypocotyl and from its green color. Stomata are present, also, in numbers upon the hypocotyl.

Under the cultural conditions in which the plant under discussion was growing, the radicle, which forms but a mere tip of the axis, was frequently found in a withered condition. The primary root of the embryo is, in fact, often destroyed. For this reason, when the embryos, usually together with the other seed-parts, finally become detached from the

tree and become established in the soil, the primary root axis does not, at least in many cases, develop. In its stead, however, one, or usually two, secondary roots (Fig. 3) are formed in the usual manner, *i. e.*, laterally, very close to the end. As a result of the mechanical relations of the tissues, these are from the start forced to grow parallel to the chief axis, and thus take the place of the chief root. That this substitution of lateral hypocotyledonary (adventitious) roots actually takes place can be shown by the intentional destruction of the chief root, which, as above stated, sometimes takes place by withering. The same thing may be induced higher up in the hypocotyl by removing the lower end by a transverse cut. Lateral injuries of various forms, even when they extended as far as the central cylinder, did not stimulate the formation of new roots, nor does this occur, excepting at the extreme lower end after longitudinal splitting of the hypocotyl. The growth of these lateral roots is considerably slower when the end is removed, from which it appears that the tissues are the less able to form roots, the further the point of injury is from the original radicle. A month to six weeks may elapse before the fundaments of these new roots may be readily seen, and the general development of the seedling is correspondingly slow. The plumule is, however, often well developed before the seedling becomes separated from the tree (Fig. 1).

A very interesting case of vivipary is recently reported by Dr. O. Stapf* to occur in one of the tropical grasses (*Melocanna bambusoides* Trin.) of the forests of Bengal. In this plant the endosperm (presumably in the mature fruit) is lacking, while the testa and pericarp are specialized to form nutrient tissues. The scutellum is very considerably enlarged and occupies the space otherwise filled by the endosperm. The scutellum, which is richly supplied with vascular tissues, acts, during germination, upon the pericarp in a manner analogous to its action in other grasses on the endosperm. Dr. Stapf believes that certain other genera (*Melocalamus* and *Ochlandra*) offer similar conditions.

Dr. J. K. Small has reported vivipary to occur in *Tillandsia*

* Nature, 65 : 548. 10 Ap. 1902.

Balbiviana Small and in one of the southwestern oaks, *Quercus fusiformis* Small. It is interesting to note in this connection that in certain of our common oaks (*Quercus rubra* L., *Q. palustris* DuRoi, *Q. coccinea* Wang., and *Q. velutina* Lam.) while vivipary, in the exact sense, has not been observed, nevertheless in these germination commences immediately upon the fruit reaching the ground in the autumn.

Vivipary, it seems, is by no means the unusual condition it has generally been supposed to be.

Teachers College, Columbia University.

A KEY TO THE NORTH AMERICAN SPECIES OF RUSSULA—II *

By F. S. Earle

Section 3, Rigidae

1.	Pileus dry, smooth, glabrous.†	2.
	Pileus pruinose, furfuraceous, areolate, etc.	5.
2.	Pileus white or tinted.	3.
	Pileus deep red or bright red.	4.
3.	Taste mild; pileus often rose-tinted.	*R. albella* Pk.
	Taste acrid; pileus pure ivory-white.	*R. albidula* Pk.
4.	Stipe white or reddish-white; pileus cinnabar-red, acrid.	*R. rubra* Fr.
	Stipe blood-red; pileus blood-red or purplish-red.	*R. Linnaei* Fr.
5.	Pileus pure white, then alutaceous, rivulose.	*R. lactea* (Pers.) Fr.
	Pileus yellow, paler with age, slightly mealy.	*R. flavida* Frost
	Pileus grayish-brown, pulverulent or scurfy.	*R. pulverulenta* Pk.
	Pileus cinnamon, rimose, then floccose.	*R. cinnamomea* Bann.
	Pileus greenish, areolate.	*R. virescens* (Schaeff.) Fr.
	Pileus rose-red.	6.
	Pileus changeable, often dingy purple when young.	7.
6.	Pileus with disk lighter, whitish, rimose-scaly.	*R. lepida* Fr.
	Pileus with disk darker, pulverulent, shining.	*R. Mariae* Pk.
7.	Lamellae white; pileus areolate.	*R. cutifracta* Cke.
	Lamellae yellow; spores yellow; pileus silky-squamulose.	*R. olivacea* Fr.

* Continued from page 103.

† Some of the species assigned to section Rigidae are glabrous and perhaps should be excluded.

Section 4, Heterophyllae

1. Pileus flesh-color or pink. 2.
   Pileus yellow or ochraceous. 5.
   Pileus brown or gray-brown. 6.
   Color of pileus changing, variable. 7.

2. Stipe concolorous, pale flesh-color. *R. polyphylla* Pk.*
   Stipe white. 3.

3. Margin of pileus tuberculate-striate, ochraceous. *R. elegans* Bres.
   Margin of pileus even, not striate. 4.

4. Lamellae crowded, shining white. *R. vesca* Fr.
   Lamellae distant, white to pale pink. *R. Morgani* Sacc.

5. Stipe whitish, equal; lamellae white, acrid, inodorous. *R. granulata* Pk.
   Stipe concolorous, equal; lamellae yellow, acrid, inodorous. *R. simillima* Pk.
   Stipe white above, reddish below, ventricose; lamellae white, discolored in drying. *R. ventricosipes* Pk.*

6. Margin of pileus tuberculate-striate; fetid. *R. foetens* (Pers.) Fr.
   Margin of pileus even; inodorous. *R. consobrina* Fr.

7. Pileus at first usually with some shade of red. 8.
   Pileus never reddish, often dingy green; mild. *R. heterophylla* Fr.

8. Flesh white, acrid; lamellae narrow. *R. variata* Bann.
   Flesh red under the cuticle; mild; lamellae broad. *R. cyanoxantha* (Schaeff.) Fr.

Section 5, Fragiles

1. Lamellae and spores white, not turning yellow. 2.
   Lamellae white, then yellow; spores lemon-yellow. 8.
   Lamellae and spores ochraceous. 16.

2. Pileus white or whitish. 3.
   Pileus some shade of yellow. 4.
   Pileus dark brown, then pale tan. *R. pectinata* Fr.
   Pileus some shade of red. 5.

3. Pellicle not viscid or separable; stipe solid. *R. anomala* Pk.
   Pellicle viscid; stipe hollow or stuffed. *R. albida* Pk.

4. Stipe short, 2–3 cm.; lamellae rounded behind. *R. ochroleuca* (Pers.) Fr.
   Stipe longer, 5–8 cm.; lamellae subdecurrent. *R. citrina* Gillet

5. Taste mild. 6.
   Taste acrid or peppery. 7.

6. Small, 2–4 cm.; margin striate; lamellae interveined. *R. uncialis* Pk.
   Larger, 4–6 cm.; margin even; lamellae not interveined. *R. purpurina* Quel.

7. Pileus tuberculate, rugose; stipe spongy, tardily acrid. *R. rugulosa* Pk.
   Pileus polished, shining; stipe solid, firm, elastic. *R. emetica* Fr.
   Pileus polished, shining; stipe hollow or stuffed, fragile. *R. fragilis* (Pers.) Fr.

8. Pileus white or pallid. *R. adulterina* (Fr.) Pk.
   Pileus some shade of yellow. 9.

* Said by Professor Peck to belong probably in section Rigidae.

Pileus some shade of red, at least when young. 10.
Pileus changeable, usually from purplish to olivaceous. 14.

9. Pileus orange, then paler; flesh white, changing to cinereous. *R. decolorans* Fr.
Pileus yellow or orange, disc darker; flesh white, unchanging, yellow under the cuticle. *R. aurata* Fr.

10. Stipe white with no reddish tints. 11.
Stipe more or less reddish. 13.

11. Small, pileus 2.5 cm. *R. pusilla* Pk.
Larger, pileus 5–12 cm. 12.

12. Margin of pileus even; taste peppery. *R. paxilloides* Earle.
Margin furrowed, tubercular; taste mild or subastringent. *R. integra* Fr.

13. Pileus smooth; lamellae subdistant, interveined. *R. integra rubrotincta* Pk.
Pileus smooth; lamellae somewhat crowded, interveined. *R. palustris* Pk.
Pileus punctate; lamellae not interveined. *R. punctata* Gillet

14. Lamellae subdistant, interveined. *R. abietina* Pk.
Lamellae crowded. 15.

15. Stipe soon hollow; pileus fading to yellowish. *R. puellaris* Fr.
Stipe soon hollow; pileus deep purple, disc black. *R. puellaris intensior* Cke.
Stipe stuffed, soft; pileus 2.5–5 cm. *R. nitida* (Pers.) Fr.
Stipe solid, spongy; pileus 7–12 cm. *R. decolorans* Fr.

16. Pileus some shade of yellow. 17.
Pileus some shade of red, at least when young. 21.
Pileus some shade of purple, often variable. 22.

17. Stipe white or whitish. 18.
Stipe ochraceous. *R. ochracea* Fr.

18. Margin of pileus even. *R. lutea* (Huds.) Fr.
Margin striate with age. 19.

19. Small; pileus 2.5–5 cm. 20.
Larger; pileus 5–10 cm., pale yellow, mild or subacrid. *R. flaviceps* Pk.

20. Pileus light yellow, then pallid; lamellae saffron. *R. vitellina* Fr.
Pileus flesh-color, then yellow; lamellae ochraceous. *R. chamaeleontina* Fr.

21. Pileus 4–7 cm.; stipe rosy pruinate. *R. roseipes* (Secr.) Bres.
Pileus 15 cm.; stipe glabrous. *R. alutacea* Fr.

22. Pileus dark purple or blackish-purple. 23.
Pileus lighter, fading to pallid. *R. nauseosa* Fr.

23. Stipe red, lamellae yellow from the first. *R. ochrophylla* Pk.
Stipe white, lamellae at first white, changing color when injured. *R. atropurpurea* Pk.

New York Botanical Garden.

A NOTE ON THE VITALITY OF THE SPORES OF MARSILEA *

By Marshall A. Howe

In 1888, Professor D. H. Campbell † alluded to the germination of spores of *Marsilea Aegyptiaca*, "in some cases twelve years old." The material with which he worked had been preserved in a dry condition in the Botanical Museum of Berlin, and the spores germinated within thirteen hours after being placed in water. In the course of some remarks on this subject before the Cleveland meeting of the Botanical Club of the American Association for the Advancement of Science, Professor Campbell is reported ‡ to have said that of spores eleven years old, fifty per cent. germinated, and of those five years old, almost all grew. In the *Botanical Gazette* for 1895 (**20**: 229), Professor Barnes recorded a still more surprising instance of retention of vitality in the case of the spores of *Marsilea quadrifolia*, which germinated after the sporocarps had been kept continuously for three years in commercial alcohol (95%), the natural inference being that the exceedingly hard wall of the sporocarp is so compact as to resist successfully the penetrating powers of strong alcohol for a period of three years at least.

In May, 1900, for use in a course of laboratory instruction in Columbia University, three or four sporocarps were taken by the writer from an herbarium specimen of *Marsilea quadrifolia* collected by L. M. Underwood and C. R. Barnes, on June 13, 1891, in Fresh Pond, near Cambridge, Mass. (whence, also, the specimens preserved in alcohol by Professor Barnes came). These sporocarps were placed in water after a small portion of the wall of each had been cut away in order to give the water a better chance to penetrate, and they soon burst open, emitting the long gelatinous ring and the attached sori in the way figured

* Read before Section G of the American Association for the Advancement of Science, Pittsburg, July 3, 1902.

† Bull. Torrey Club, **15**: 259. O. 1888; Berichte Deutsch. Bot. Gesellsch. **6**: 340. 1888.

‡ Bot. Gaz. **13**: 235. S. 1888.

in most of the larger botanical text-books. Later, the prothalli were formed, but the spermatozoids were not seen in a motile condition at this time owing to the lack of continuous observation. They were seen, however, in great numbers after the motile period, filling the walls and passage-way of the gelatinous funnel which forms about the female prothallus. In May, 1901, the experiment was repeated with similar results. In May, 1902, a sporocarp from the same material, having then been in the herbarium practically eleven years, was placed in water, and the stages of the resulting germination of the spores were watched more carefully. Swarms of motile spermatozoids were noticed after about fourteen hours, and for eight hours longer a greater or less number could be found in motion. Nearly every spore in the sporocarp germinated. Some of the megaspores were finally removed from the water and kept upon wet filter-paper for ten days, when embryo-sporophytes, with the first leaf a centimeter long, had developed. The remarkable vitality of these eleven-year-old spores naturally suggested that the age-limit for germination had not been reached, and attempts were made to germinate spores from about twenty other specimens of various species which had lain in the herbarium for periods varying from twelve to thirty years. In one of these cases the attempt was successful. This was with material of *Marsilea vestita* preserved in Professor Underwood's herbarium, and collected by Mr. W. N. Suksdorf, in Falcon Valley, Washington, the pocket bearing the double date "Nov., 1883" and "Aug., 1884." The spores were germinated on June 7, 1902, so that even supposing August, 1884, the later of the two dates, to be the correct one for the material used, vitality had been retained for practically eighteen years. Six sporocarps were tried, all of which opened in the normal fashion. Nearly all of the megaspores formed prothalli with archegonia. After fertilization, embryos of considerable size were grown by sowing the spores on damp filter-paper. Of the microspores, practically all showed advanced stages of germination, such as the formation of the prothallus and protrusion of the antheridum, but only about a half of them set free motile spermatozoids. The first free spermatozoids were seen in 11¼ hours after the sporocarps were placed in water.

The writer finds no published record in regard to long-continued vitality of the spores of *Marsilea* which equals the case described above, though it is more than probable that a period of eighteen years does not exhaust the possibilities in the matter. Failure in the experiments with spores of greater age is inconclusive as is shown by numerous failures with material of a much less age. It is evident that much depends upon the collection of the sporocarps at just the right stage of maturity.

SHORTER NOTES

A NEW HEMIZONIA FROM CALIFORNIA. — **Hemizonia grandiflora.** Annual: stems erect, branching, 1–3.5 dm. high, glandular-villous and somewhat heavy-scented: leaves all sessile, the lowest opposite, linear-lanceolate, acute, 8–15 cm. long, serrulate and scabrous on the margins, sparsely lanate with very long appressed hairs, those subtending the main branches similar but alternate, those of the floral branches reduced, 1–3 cm. long, obtuse, or the longer ones acutish, glandular-pubescent: heads very showy, 2.5–3 cm. broad: involucral bracts broadly lanceolate, subacute, 6–7 mm. long: rays 8–10, 10–12 mm. long, 7–9 mm. wide, 3-lobed to near the middle, the lobes obtuse, the middle one about half as broad as the outer ones and somewhat shorter, pure white or the midveins of the lobes pinkish beneath; disk corollas glabrous without, their lobes ciliate within toward the apices: outer bracts of the receptacle united into a cup: achenes black, very shortly stipitate, obovate, smooth, rounded on the back and faintly keeled, 2.75 mm. long, 1.5–1.75 mm. broad.

This species is closely related to *H. luzulaefolia* DC., but differs from that species in having much larger heads, involucral bracts and achenes, and greener foliage. The conspicuous lanate leaves are confined to the base in *H. luzulaefolia*, while in this species they extend up on the stem and subtend the main branches. Finally, *H. luzulaefolia* is a late summer and autumnal species, while this is in full bloom in the middle of May and will have fruited and gone before that species begins to flower.

Crystal Springs Lake, San Mateo Co., California. Growing on hillsides which are composed of serpentine rocks. Collected by the writer (no. 2446) 11 May, 1902. LEROY ABRAMS.

An undescribed Species of Hydrophyllum.—Early in May of 1899 Dr. MacDougal collected a number of plants in northern Minnesota and sent them to the New York Botanical Garden. A *Hydrophyllum* of this collection bloomed in June of this year for the first time, alongside of plants of *Hydrophyllum Virginicum*, obtained in 1896 from Mr. Harrison, of Lebanon Springs, N. Y.

The Minnesota plant much resembles *H. Virginicum* in habit and foliage; but differs from it strikingly in floral characters. At the time of flowering the calyx-segments are erect against the corolla, while in *Virginicum* they are widely spreading, and in the new species they remain nearly erect in fruit; in both species they are narrowly linear and about equally ciliate. In *H. Virginicum*, the corolla-segments are erect, while in the Minnesota plant their tips are spreading; the color of the corolla is a marked purple in the new species, while in the plants of *Virginicum* studied, the corolla is pale, nearly white, although I think, from observations made on *Virginicum* in the Alleghanies, that the color in that species varies considerably. In *H. Virginicum* the petioles are slightly ciliate, while in the Minnesota plant the upper ones are strikingly so.

The foliage of the two species is however so similar that I have not yet been able to sort them satisfactorily in the herbarium, except by the ciliate petioles, which I am not sure is a constant character. I call the new species **Hydrophyllum patens.**

N. L. Britton.

Notes on Verbena.—I. **Verbena racemosa.** Annual (?), hirsute. Stem branched at the base, the several branches erect and ascending, 10–20 cm. tall: leaves firm; blades oval or ovate in outline, about 2 cm. long, 1.5 cm. wide, deeply twice 3-parted into linear segments, the lower ones petioled, the upper nearly sessile: spikes terminating the branches, short-peduncled, cylindric, 2–4 cm. long at maturity, rather dense: bracts 4–7 mm. long, lanceolate: calyx rough-hairy, surpassing the bracts; lobes linear-subulate, shorter than the tube: corolla light blue or nearly white, 1 cm. long, persistent; limb about 4 mm. broad: fruit 3 mm. long.

In low places on sandy soil, from the vicinity of El Paso to Martin County, Texas. April to June. *Verbena racemosa* is

related to *V. bipinnatifida* with which it has heretofore been associated. It differs from the latter species in the narrow leaf-segments and the smaller, pale and persistent corollas. It hybridizes with *Verbena Wrightii.*

II. **Verbena brevibracteata** (A. Gray). [*V. bracteosa* var. *brevibracteata* A. Gray, Syn. Fl. N. Am. **2**: 336. 1878.] This plant is so different from *Verbena bracteosa* that I am surprised it was associated with that species as a variety. It has an erect habit and grows in sandy woods or in fields. The flowers are in dense spikes and the corolla is red and twice as large as that of *V. bracteosa.*

HENRY EGGERT.

EAST ST. LOUIS, ILLINOIS.

LUNULARIA CRUCIATA "IN FRUIT."—*Lunularia cruciata*, heretofore recorded as "gemmiferous but always sterile in America," has at last fruited here. In a large lath-house belonging to the California Nursery Company, in Niles, California, this hepatic is very abundant, overrunning the half-sunk pots and the ground between them.

Early in April on the drier parts of this shady earthen floor, the *Lunularia* was found to bear many of the small, white tuft-like sheaths that cover the young archegonial receptacles. Two weeks later quantities of the androecia were observed on the same plants but not in any case on the very same division of the thallus. By the 9th of May there were eleven perfect capsule-bearing receptacles and many that were just beginning to push through the scales of the sheaths, the silvery, pellucid peduncles shining through the fimbriate edges. Later, many of these perfected, but more just withered as the air became drier and warmer.

This lath-house is for the protection of potted azaleas, rhododendrons, araucarias, acacias, etc., is kept damp, and is of course more open to wind and rain than a glass house. Possibly these conditions approach those of the European habitats of this liverwort.

JULIA T. SHINN.

NILES, CALIFORNIA.

PROCEEDINGS OF THE CLUB

Wednesday, May 28, 1902

This meeting was held at the New York Botanical Garden at 3:30 p. m.; Dr. MacDougal in the chair; 15 persons present.

The reading of the minutes was dispensed with on account of the absence of the secretary.

The first paper on the program was by Mrs. N. L. Britton, under the title "Remarks on West Indian Mosses." Comments were made on several questions of synonymy and nomenclature arising from a study of collections recently made in Porto Rico by Mr. A. A. Heller and by Professor Underwood, and in St. Kitts by Dr. Britton. Attention was directed particularly to the genus *Scmatophyllum* Mitt. 1864 (= *Raphidostegium* De Not. 1867 = *Rhynchostegium*, section *Raphidostegium* Br. & Sch. 1852). This genus is chiefly tropical or subtropical in its distribution, though eleven species are known to occur in North America north of Mexico.

The second paper was by Dr. P. A. Rydberg, on "Some Genera of the Saxifragaceae." The speaker presented some of the results of studies intended as a contribution to a projected work on the flora of North America. The family name Saxifragaceae was used in a restricted sense, excluding *Ribes*, *Hydrangea*, *Philadelphus*, *Parnassia*, *Itea*, etc. The members of the family in the narrower sense are all herbaceous plants with the exception of a single species of *Heuchera* which has a sort of aërial woody stem. Dr. Rydberg commented especially upon the genera *Bolandra*, *Therofon*, *Telesonix*, *Hemieva*, *Tiarella*, *Heuchera*, *Tellima*, *Lithophragma*, *Mitella*, and *Chrysosplenium*, referring to the geographical distribution and number of species of each. *Heuchera* is the largest of these genera, being represented by 58 species in North America, including Mexico. The paper was discussed by Dr. Britton and others.

Professor F. S. Earle made a brief report on a recent trip to western Texas and eastern New Mexico, stating that 800 numbers of botanical specimens were collected. April and May

seemed too early in the season for finding many herbaceous plants in flower and this was especially the case with the monocotyledons.

Dr. N. L. Britton showed specimens of *Washingtonia longistylis* collected a few days previously near Washington, D. C., differing from Torrey's type of the species in greater hairiness.

Mrs. Britton alluded to the organization of "The Wild Flower Preservation Society of America." Professor Earle remarked upon the region west of the Pecos River, where vegetation has been nearly exterminated by overstocking with cattle, as a proper field for the activities of the Society.

Dr. MacDougal showed a corm of *Amorphophallus*, kept for twenty months in a dark room, where it had flowered. New buds, apparently adventitious, had formed near its base.

MARSHALL A. HOWE,
Secretary pro tem.

NEWS ITEMS

Dr. W. Seward Webb has contributed $6,000 toward the fund for the purchase and maintenance of the Pringle herbarium by the University of Vermont.

Hon. Addison Brown, president of the Torrey Botanical Club, received the degree of LL.D. from Harvard University at the last commencement.

Professor F. S. Earle, assistant curator of the New York Botanical Garden, was recently granted the honorary degree of A.M. by the Alabama Polytechnic Institute.

Professor Alexander W. Evans, of Yale University, and Mr. Percy Wilson, of the New York Botanical Garden, are making botanical collections in Porto Rico under the auspices of the latter institution.

Dr. William A. Murrill, of the Boys' High School, New York City, is spending the summer in Europe, where he will devote especial attention to the study of type specimens of fungi, particularly those of Fries in Sweden, and those of Berkeley and Cooke in England.

Representatives of the Torrey Club enjoyed the generous hospitality of the Syracuse Botanical Club on the Fourth of July. A party of forty spent the day in the vicinity of the "green lakes," near Jamesville, N. Y. The following day was chiefly devoted to collecting in the saline formation about Onondaga Lake.

"The Home Aquarium and how to care for it" is the title of an illustrated octavo work of 213 pages written by Mr. Eugene Smith and recently published by E. P. Dutton & Co., of New York. The book will prove of service in the determination as well as in the cultivation of some of the common aquatic plants and animals.

We learn from *Science* that Dr. E. C. Jeffrey, instructor in the University of Toronto, has been appointed assistant professor of vegetable histology and general morphology in Harvard University; also that Professor F. A. Waugh, of the University of Vermont, has been called to the chair of horticulture in the Massachusetts Agricultural College at Amherst, Mass.

The recent meeting of the American Association for the Advancement of Science at Pittsburg was of unusual interest to botanists. The association now includes about 3,500 members, and 320 papers were read at the sessions, of which 79 were purely botanical, while many other titles were presented before various sections and in the meeting of various affiliated societies, the subject matter of which lay chiefly in botany. The vice-presidential address by Dr. B. T. Galloway on "Applied Botany, Retrospective and Prospective" was a masterly presentation of the practical applications made of botanical knowledge and presented a clear outline of the phases of the subjects from which direct useful results may be expected. Mr. F. V. Coville was elected chairman of Section G for the coming meeting at Washington during the convocation week, and Dr. C. J. Chamberlain secretary. Twenty-three papers were read at the session of the Botanical Club, and the committee on nomenclature held numer-

ous and protracted sessions in which definite progress was made in dealing with some of the open questions in nomenclature.

The Wild Flower Preservation Society of America held a business meeting of its board of managers, and a popular meeting, in which the greatest interest was evinced in the purpose and rapid progress of this new organization.

Dr. Halsted's address as past president of the Botanical Society of America was not given owing to his continued illness, but about thirty papers were read before this body, many of which embodied the results of completed researches and represented the principal phases of the entire subject. Dr. B. T. Galloway was elected president and Dr. D. T. MacDougal, secretary, for the ensuing year. This organization passed a series of resolutions on Monday, June 30, 1902, by which the sum of $500 is set aside from its yearly income, this year and every succeeding year, to be used in making grants in aid of investigations. This measure goes into operation at once, and applications from the members and associates of the Society may be sent to the secretary at any time. The funds of the Botanical Society of America consist of the accumulated dues paid in by the members, and the grants in question probably constitute the only series ever offered in America, the money for which has been contributed wholly by a body of scientific workers. [D. T. MacD.]

OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

(1) BULLETIN

A monthly journal devoted to general botany. Vol. 28, published in 1901, contained 706 pages of text and 49 full page plates. Price $3.00 per annum. For Europe 14 shillings. Dulau & Co., 37 Soho Square, London, are agents for England.

Of former volumes, only 1–6 and 19–28 can be supplied entire from the stock in hand, but the completion of sets will be undertaken. Yearly volumes 1–5 (1870–1874), one dollar each. Vol. 6 (1875–1879), extending over five years, is furnished at the subscription price of five dollars. Vols. 19–27 (1882–1900) are furnished at the published price of two dollars each; Vol. 28, three dollars.

Single copies (30 cts.) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The MEMOIRS are published at irregular intervals. Volumes 1–7 and 9 are now completed and Nos. 1 and 2 of Vol. 8 and No. 1 of Vol. 11 have been issued. The subscription price is fixed at $3.00 per volume in advance. The numbers can also be purchased singly. A list of titles of the individual papers and of prices will be furnished on application.

(3) **The Preliminary Catalogue of Anthophyta and Pteridophyta** reported as growing within one hundred miles of New York, 1888. Price, $1.00.

Correspondence relating to the above publications should be addressed to

THE TORREY BOTANICAL CLUB
Columbia University
NEW YORK CITY

Vol. 2 September, 1902 No. 9

TORREYA

A Monthly Journal of Botanical Notes and News

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

MARSHALL AVERY HOWE

JOHN TORREY, 1796–1873

CONTENTS

The Vegetation of northwestern Oregon: J. E. Kirkwood 129
Extrusion of the Gametes in Fucus: George J. Peirce 134
Mutual Irregularities in opposite Leaves: Francis E. Lloyd 137
A Key to the North American Species of Lactarius: F. S. Earle 139
The Pith Cells of Phytolacca decandra: Henry Kraemer 141
Shorter Notes:
A new Station for Isotria affinis: P. A. Rydberg 143
News Items 144

Published for the Club

At North Queen Street, Lancaster, Pa.

by The New Era Printing Company

THE TORREY BOTANICAL CLUB

OFFICERS FOR 1902

President,

HON. ADDISON BROWN.

Vice-Presidents,

T. F. ALLEN, M.D. HENRY H. RUSBY, M.D.

Recording Secretary,

EDWARD S. BURGESS, PH.D.
Normal College, New York City.

Corresponding Secretary,

JOHN K. SMALL, PH.D.
Botanical Garden, Bronx Park, New York City.

Editor,

L. M. UNDERWOOD, Ph.D.,
Columbia University.

Treasurer,

FRANCIS E. LLOYD, A.M.
Columbia University.

Associate Editors,

NATHANIEL L. BRITTON, Ph.D. FRANCIS E. LLOYD, A.M.
CARLTON C. CURTIS, Ph.D. DANIEL T. MACDOUGAL, Ph.D.
MARSHALL A. HOWE, Ph.D. HERBERT M. RICHARDS, S.D.
ANNA MURRAY VAIL.

TORREYA is furnished to subscribers in the United States and Canada for one dollar per annum; single copies, fifteen cents. To subscribers elsewhere, five shillings, or the equivalent thereof. Postal or express money orders and drafts or personal checks on New York City banks are accepted in payment, but the rules of the New York Clearing House compel the request that ten cents be added to the amount of any other local checks that may be sent. Subscriptions are received only for full volumes, beginning with the January issue. Reprints will be furnished at cost prices. Subscriptions and remittances should be sent to Treasurer, Torrey Botanical Club, 41 North Queen St., Lancaster, Pa., or Columbia University, New York City.

Matter for publication should be addressed to

MARSHALL A. HOWE
New York Botanical Garden
Bronx Park, New York City

Vol. 2 No. 9

TORREYA

September, 1902

THE VEGETATION OF NORTHWESTERN OREGON

By J. E. Kirkwood

A glance at the map of Oregon will show that the northwestern part of the state is mostly mountainous. In fact, that area which lies south and west of the lower course of the Columbia River, comprising mainly Columbia, Clatsop and Tillamook counties, is a mountainous region traversed by the narrow valleys of such small streams as the Nehalem and Nestucca rivers. From the Columbia River extending southward the Coast Mountains leave little space between their bases and the ocean, most of the tillable land of this section being found on the lower foothills and in the broadened outlets of the canyons of streams which head among the mountains and empty directly into the sea. East of the Coast Mountains lies the Willamette valley which contains most of the farming land of the state west of the Cascades. The flora of this region presents some interesting features.

As it has been about fifty years since the first considerable immigration into western Oregon, most of the original forest-covering has been removed from the lowlands. In those parts of the valley where this has occurred, a remnant of the forest remains along the banks of streams whose location and course may by this means be determined from a distance. Some of the trees which occupy such situations are easily recognized for miles by an experienced eye. Especially is this true of *Abies grandis* with its cylindrical outline and bluntly conical top. At shorter range one may easily recognize *Thuya gigantea* and *Pseudotsuga macro-*

[The exact date of publication of each issue of Torreya is given in the succeeding number. Vol. 2, No. 8, comprising pages 113–128, was issued August 2, 1902.]

nata. But such places are the special habitat of *Abies* and *Thuya* of the species above mentioned and *Taxus brevifolia* representing the gymnosperms, which are associated with a lower growth of deciduous trees and shrubs, among which are very readily found *Fraxinus Oregana, Acer circinatum, A. macrophyllum, Cornus Nuttalli, Prunus emarginata, Alnus Oregana, Philadelphus Californicus, Spiraea Douglasii, Holodiscus discolor* and *Viburnum ellipticum.*

These form in most places dense thickets of undergrowth overhanging the muddy banks of the streams. So far as was observed, the vegetation above described was very uniform. As we ascend the streams from the alluvial lowlands toward the hills, however, a considerable difference may be observed.

The uplands, as the term is here used, have an altitude of from 200 to 500 feet above sea-level and include practically all the soil not restricted to creek or river bottoms within this altitude. They may not be much higher than the bottom lands but the soil contains more sand, is coarser and drains dry more readily. This brown loam, at the most but a few feet in depth, is underlaid by a clayey subsoil. The uplands are undulating with here and there comparatively small areas, swales, with a peculiar clayey soil supplied with springs and possessing some peculiarities of vegetation.

The forest covering of the uplands consists mainly of *Pseudotsuga.* As a rule no other gymnosperms are present. In many places this tree has such a monopoly of soil and light as to exclude almost everything else. In the more open woods, however, we find *Cornus, Acer, Corylus, Spiraea,* and sometimes *Quercus Garryana. Quercus* usually forms groves by itself and does not grow so well in the open forest of *Pseudotsuga* as do some other deciduous trees. There is not a large number of deciduous trees and shrubs and most of the lower growth of the upland forests consists of but few species of the genera above named. A smaller shrubby growth consisting of species of *Gaultheria* and *Berberis* constitutes nearly all of the immediate soil-covering over large tracts of forest land.

The swale areas, as has already been said, possess some peculiarities worth noticing. While the Douglas spruce is still the

most prominent feature of the vegetation, yet it is not so abundant as elsewhere and leaves space for a luxuriant undergrowth of *Fraxinus*, *Crataegus*, *Spiraea*, *Amelanchier*, *Acer*, *Salix*, etc. It will be noticed that we meet here the same genera which are characteristic of the bottom lands, and, it may be added, the same species as well. Although the soil is wet, as is indicated by the roots of trees which spread over the surface of the ground instead of growing downward, yet we do not find those gymnosperms which are most characteristic of bottom lands. Here, too, we find little of *Gaultheria* and *Berberis* so characteristic of the rolling lands and in the more open spaces find species of *Rosa* and *Symphoricarpos* and dense thickets of *Spiraea Douglasii*.

Some of the densest forest-covering of the upland is second-growth Douglas spruce some forty or fifty years old. As a rule, in such woods there are large trees of a much greater age whose low, wide-reaching branches indicate an isolated condition during most of their earlier years. It is said by the older inhabitants that before much immigration had taken place, considerable areas of land in the lower Willamette valley were covered only by large isolated trees and a luxuriant growth of grass, a condition, as they say, maintained by the Indians. As parts were fenced off by the settlers for cultivation, the rest was neglected and soon sprang up to undergrowth which one sees to-day as a forest of young trees fifty feet or more in height. Whether the report is true or not, the forest conditions in many places now show plainly that a younger forest has arisen there in the last fifty years. A tract of land which was under the writer's own observation in 1884, was then almost entirely devoid of undergrowth, the growth having been cleared off and burned a few years previous. In the summer of 1901, however, this tract was again visited and found covered with an almost inpenetrable growth mostly of young *Pseudotsuga*, about twenty feet in height. The Douglas spruce is, however, not the first to appear on neglected areas. As a rule, a growth of *Salix* soon appears, and for some time it is the only thing in sight. Later, this growth is largely replaced by other deciduous shrubs, *Corylus rostrata*, *Holodiscus discolor*, etc., which in turn yield to the spruce. The forest encroaches

very readily on neglected pasture lands and other areas which have previously borne forests. This we may see demonstrated in tracts devastated by forest fires, though such cases are found mostly in mountainous regions. The conditions above described are found mainly in the northern part of the Willamette valley.

The valleys of streams tributary to the Willamette which head in the Coast Mountains are flanked in their upper parts by forests of much the same character as those described above. Along these streams it is noticeable that the vegetation is much the same as that which characterizes the river bottoms already described but along with *Thuya* and *Abies* we find *Tsuga heterophylla*. In the undergrowth the occurrence of *Rubus spectabilis* is occasionally marked. Among the more prominent herbaceous plants *Micrampelis Oregana* is often very conspicuous, covering shrubs and small trees to a height of twenty feet or more.

The vegetation of the Coast Mountains is a heavy forest growth, mostly of *Pseudotsuga* with a considerable sprinkling of *Tsuga* and *Thuya;* of the deciduous trees there are species of *Acer*, especially *A. circinatum*, and *Alnus*. In the older burned areas, *Alnus* springs up plentifully along the water courses and every small ravine with springy soil is marked by a line of alders. Comparatively little of the second growth in these "burns" is evergreen; willows and alders are by far the most conspicuous. Most of such burned areas have very little forest growth at all to show in place of the once magnificent growth which covered the mountain tops and the bleached remains of which are still standing or lying upon the ground. In such places the most conspicuous growth is the ubiquitous *Pteridium aquilinum* which often excludes everything else except shrubby plants such as *Rubus Nutkanus* and species of *Vaccinium*.

That section of the state which lies between the summit of the Coast Range and the Pacific Ocean is much more abundantly supplied with moisture than the Williamette valley and parts farther east. The mean annual rainfall in this belt is not far from 80 inches. On the eastern slope of the range it is much less, about 60 inches, diminishing to about 50 inches in the middle of the valley. In some places on the coast the mean precipitation

is even greater. Although, as is the case in the interior, the months of July and August are the driest of the year and about two per cent. of the rainfall of the year occurs in these months, still the western slope of the range is covered by heavy fogs for much of the time during this period. Consequently, vegetation here lacks very little water at any time during the year.

Along the water-courses everywhere in this region the shrubby vegetation appears pretty much the same. *Rubus spectabilis*, the salmon-berry, as it is commonly called in the region where it grows, forms dense thickets with *Acer circinatum* and *Sambucus racemosa*. In the lower lands the alders are larger but usually do not form the dense thickets which are frequently found at higher altitudes. In the more open bottoms *Echinopanax horridum* frequently appears though it seems to prefer the bottoms of deep canyons and more abundant shade. The leaves of this Devil's-cane, as it is commonly called, are from a foot to eighteen inches across and spreading out horizontally make a very showy appearance and form a very characteristic part of the vegetation along deeply shaded streams.

On the lower hills near the coast the forest consists mainly, in some places at least, of *Picea Sitchensis*. It is not found in this latitude many miles from the beach and so far as the writer has observed does not attain the splendid proportions which are reached by the Douglas spruce in its favorite habitat. This tree reaches its best development back a mile or two from the beach but is not conspicuous at high altitudes. It holds the outposts of arboreal vegetation on the sand dunes, which it shares with *Pinus contorta*, but in such places like other trees it is dwarfed and stunted.

In the Coast Mountains the range of arboreal species is not great. The predominant element of the vegetation is the so-called fir, or Douglas spruce, along with lesser quantities of other trees already mentioned; the latter, however, rarely if ever occur in sufficient quantity to lend any special character to the landscape.

While there is a uniformity in distribution throughout the mountainous regions, of those plants mentioned above as occur-

ring in the Coast Range, one is often impressed by the abrupt transition from the vegetation of the flat and open uplands of the lower Willamette valley to that of the mountains. A comparison of the Nehalem and Willamette river valleys is a case in point. The Nehalem flows through a mountainous region and in part of its upper course is separated from the Willamette valley by a low range of mountains some ten miles across. While there is a difference of not more than 500 feet in the altitude of the two valleys at some places, there is a marked difference in soil and vegetation. The Nehalem valley has practically the same vegetation as the mountain region which it drains. As one crosses the divide into the Nehalem region the difference in the vegetation is readily apparent. The oak is left behind but the hemlock becomes conspicuous. Instead of the vegetation peculiar to the stream bottoms of the lower country, the water courses are fringed with the wild currant, salmon-berry and Devil's-cane, for the most part. In a detailed description of the flora, various other differences might be mentioned. The whole region offers an interesting field for the study of the distribution of native species.

Syracuse University.

EXTRUSION OF THE GAMETES IN FUCUS

By George J. Peirce

Dr. E. B. Copeland's note in Torreya for November, 1901, on the extrusion of the gametes of *Fucus* suggests a comment or two.

In the first place, Thuret * in 1854 and Oltmanns † in 1889 said that the escape of the egg-cells and spermatozoids is "hastened" by exposing fertile branches to the air. There may be other appearances of the same statement, but these two are worth instancing. I doubt either of these authors being willing

* Thuret, G. Recherches sur la fécondation des Fucacées. Ann. d. Sci. Nat., IV. 2 : 197–214. 1854.

† Oltmanns, F. Beiträge zur Kenntniss der Fucaceen. Bibl. Botanica, 3^{14} : 1–94. 1889.

to say or to imply more than that the escape of the reproductive elements is *hastened* by the drying and contraction of the fertile fronds when they are exposed to the air. Unless I do Dr. Copeland an injustice, he does imply that their escape is effected by the shrinkage of the parts. On this point I wish to state my own experience.

Last summer and the summer before, at the Hopkins Seaside Laboratory, Pacific Grove, California, I repeatedly put the fruiting tips of *Fucus evanescens* Ag., into glass dishes of sea-water and left them, often for two weeks, without changing the water or baring the plants. The gametes escaped nevertheless, spores and young plants of various ages presently appearing on the bottom of the dishes. In this way I was able to get a series of young plants consisting of from one to many cells.

In these cases, neither water-pressure nor the compression of the parts within by the drying and contraction of the outer parts, can have had anything to do with the escape of the spores. Another factor was concerned, namely, the solution of the gelatinized walls and other gelatinous material surrounding the gametes. When this goes into solution, the antherozoids can swim out of the conceptacles. This does not, however, account for the escape of the non-motile egg-cells. It will be noticed that the fruiting tips of this species of *Fucus* are covered with gelatinous drops, a drop at the mouth of each conceptacle, whether the plants are submerged or exposed. The drops ooze out, that is are squeezed out, from the cavity of the conceptacles. The expressed slime may become so abundant as to form a coating over the surface of the fruiting tip. The pressure which forces this out is developed by the parts surrounding the conceptacle and first becomes effective when the antherozoids and egg-cells, or the antheridia and oögonia, become detached and are imbedded in a gradually dissolving gelatinous matrix. As this gelatinous material dissolves, it resists the compressing effect of the walls of the conceptacle less and less, and presently becomes squeezed out through the mouth of the conceptacle.

So far as this species of *Fucus* is concerned, therefore, the extrusion of the gametes (or, more properly, of the sexual

organs) from the conceptacles, is accomplished by mechanical pressure which is developed within the plant, whether the plant dries and contracts or not. I fancy the same thing is true of the other species of *Fucus* on this coast, and also of the species on the Atlantic Coast, including the unnamed one about which Dr. Copeland writes. It is obvious, however, that the drying, contraction, and compression, of which Dr. Copeland speaks, will supplement the pressure which normally develops within the plant itself.

Where *Fucus* grows in thick masses covering the rocks between tide-marks, only those plants living far up on the sides and on the tops of rocks will have any considerable part directly exposed to the air and sun. When the tide goes out, a very small part of a mass of *Fucus* is wholly exposed, as the fronds overlie and protect one another, only the topmost layer being wholly uncovered. Of course the overlapping is more or less incomplete, so that some of the tips of the plants below may be exposed. These exposed tips and whole plants represent, however, only a small proportion of all the fruiting parts. These exposed parts are the only ones which would dry and contract in such a way as to expel the reproductive organs and elements, and yet other plants and other tips are undoubtedly also fertile, in the fullest sense of the word.

Again, the amount of drying, contraction and consequent forcing out of the reproductive parts when low tide comes at night would be very slight. Are such tides unfavorable to reproduction? Then, too, there is little or no drying of *Fucus* or anything else in fog or rain. At these times, too, the gametes, if ripe, should be forced out of the conceptacles.

I think I have shown the desirability of the plants' possessing some adequate means of removing the gametes from the conceptacles no matter what the weather, the time of day and the state of the tide may be. Unfortunately I cannot prove that the Atlantic * species of *Fucus* are in this respect as independent of

* [There are at least three very distinct species of *Fucus* about New York City: a hermaphrodite species (*F. spiralis* L.?) found only near the high-water mark; a dioecious species (*F. vesiculosus* L.) of rather wide range in the littoral zone; and a hermaphrodite species (*F. evanescens* Ag.) growing near the low-tide line and in

atmospheric conditions as are our Pacific species. At all events the matter deserves further examination.

Stanford University, California.

MUTUAL IRREGULARITIES IN OPPOSITE LEAVES

By Francis E. Lloyd

It is not uncommon to find that the leaves of the lilac (*Syringa vulgaris* L.), which are generally supposed to present little variation in shape, become notched on one side. A tooth or a lobe of considerable size may thus be formed, so that the simple cordate leaf is then lobed asymmetrically. The lobe is sometimes of quite regular form and ends in a fine tooth at the tip. It is moreover supplied with veins which give it a normal appearance. At other times it is more rounded; or there may be nothing more to suggest it than a rounded irregularity on the margin, accompanied by a slight warping of the leaf blade near by.

Now it has further been observed that when such an irregularity occurs, the leaf opposite—the leaves being in decussating pairs—has with few exceptions a similar lobing, but on the *other* side of the midrib; and therefore, since the ventral surfaces of the leaves are opposed in the bud, on the same side of the axis of the stem. A considerable number of similar instances have been observed by me in some other plants with opposite simple leaves, namely in *Lonicera* and *Forsythia*. What appears at first blush to be a variation of the same kind may occur also in compound leaves, and such a case I have found in the European ash, in which the terminal leaflets of a pair of opposite leaves showed mutual variations but in this case on the *same* side of the midrib. In one of the leaflets a lateral lobe only was formed, while on the other a complete lateral leaflet appeared in the corresponding position. The condition recalls that which arises in the juvenile opposite leaves of some plants (*Phascolus*) and in the alternate leaves on the new shoots of others (*Rubus occidentalis*, *R. nigro-*

some cases rarely, if ever, uncovered. Farther north on the Atlantic coast, *Fucus edentatus* De la Pyl. and *F. serratus* L. are found near the low-water mark and do not as a rule become very dry at the ebbing of the tide.—Ed.]

baccus, and *Rhus radicans*, the last with four or five partial or complete leaflets) or again on the older parts of the Japanese ivy (*Parthenocissus tricuspidata*).

Setting aside these cases of the ash and other compound-leaved plants, the explanation of the above-described phenomenon is to be found in the behavior of the leaf fundaments in the buds. In the case of the lilac the pair of youngest leaves is so disposed in the bud that the ventral surfaces of the two are faced and that their margins lie each against the other, and match exactly. As the leaves enlarge their blades become thinner and so curved that one leaf comes to be infolded by the other. It sometimes happens however that during the time that blades begin to overlap, the margins, as the result of unequal growth or pressure cross one another at one or more points, and further development is retarded at those places. That this crossing is the cause of the notching or lobing there can be no doubt, since I have found a pair of leaves in which the notches were so deep that the blades became too closely interlocked to be able, during their expansion from the bud, to separate.

That other irregularities of form, also, such as a sudden narrowing of the blade toward the apex, are due to similar causes, is apparent from the circumstance that these, too, are often asymmetrically mutual in opposite leaves, and that upon careful examination, other evidences of compression are to be seen.

Examination of the leaf fundaments in *Lonicera* and *Forsythia* shows that the above explanation is undoubtedly correct for them also. Whether a similar mechanical explanation is true also for the ash I have some doubt, and the cases of analogous appearances in alternate leaves cited are still more puzzling.

That the variations in the ash occur on the same side of the leaflets speaks against the application of the same explanation must be admitted, although it is to be noted that in the lilac the variations are sometimes mutual in the same way, namely on the same side of the midrib. This is to be explained by the fact that the crossing of the leaf margins does not always set up a disturbance of growth in both leaves involved at once.

This apparently unimportant phase of the study of leaf varia-

tions has, so far as I can learn, not been noticed before, and such variations may have but trifling significance.

It would be interesting in this connection to know whether these abnormal appearances, if we may call them such, are more frequent in leaves which appear in the spring — those therefore whose fundaments were laid down during the previous growing season — for we might suspect that the formation of the stiff, resistant bud scales of the winter buds, both during their first formation and their subsequent more or less irregular early spring development, would set up rather more pronounced, if not different, mechanical conditions than the scales or leaves of the more evenly developing summer buds.

I have to thank Miss Mary E. Hart for first drawing my attention to the variations in lilac leaves, and Miss Elsie M. Kupfer, who at my suggestion searched for and found a good number of fine examples of the same thing.

Teachers College, Columbia University.

A KEY TO THE NORTH AMERICAN SPECIES OF LACTARIUS—I

By F. S. Earle

The species of this genus are at once distinguished from all other mushrooms by the flowing of a more or less abundant milky juice when cut or wounded. Many of the species are exceedingly acrid or peppery when raw but as is the case with the nearly allied Russulas this is said to disappear on cooking and most of the species are considered to be edible. So far as known, none of them contains a poison. As a rule they require longer cooking than most other mushrooms.

The most important paper on our American species is that by Peck in the 38th Report of the New York State Museum, in which he gives a synopsis and full descriptions of the species known to occur in the State. Of the following seventy-six species and varieties that have been reported as occurring in North America thirty-one have been described by Professor

Peck. Five others are supposed to be exclusively American while forty are common to this continent and Europe.

KEY TO THE SECTIONS OF THE GENUS

1. Stipe central or nearly so. 2.
Stipe excentric or lateral (none known from North America). Sec. PLEUROPUS.

2. Milk at first white, sometimes changing color on exposure. 3.
Milk bright-colored (red, blue, etc.) from the first. Sec. DAPETES.

3. Lamellae not changing color with age, not pruinose; milk usually acrid (Sec. Piperates). 4.
Lamellae pallid, then darker and pruinose; milk usually mild. Sec. RUSSULARIA.

4. Pileus viscid, at least when young. 5.
Pileus dry, naked or clothed, not shining. Subsec. PIPERATI.

5. Margin of pileus naked from the first, pelliculose. Subsec. LIMACINI.
Margin of pileus at first tomentose. Subsec. TRICHOLOMOIDEI.

SUBSECTION TRICHOLOMOIDEI

1. Milk white, soon changing to yellow. 2.
Milk white, unchanging. 6.

2. Stipe scrobiculate-spotted; pileus yellow, depressed. *L. scrobiculatus* (Scop.) Fr.
Stipe not spotted. 3.

3. Pileus large, 10–15 cm., deeply depressed or infundibuliform, glabrate. 4.
Pileus smaller, 4–10 cm., convex to subplane, villous. 5.

4. Stipe villous. *L. resimus* Fr.
Stipe glabrous. *L. regalis* Pk.

5. Pileus dingy flesh-color to pale reddish bluff. *L. cilicioides* Fr.
Pileus at first white, dirty yellow when old. *L. cilicioides albus* Pk.

6. Pileus white or whitish. 7.
Pileus brownish or olivaceous. 9.

7. Pileus azonate, glabrous, margin soon naked. *L. subinsulsus* Pk.
Pileus more or less zoned, clothed. 8.

8. Pileus white to pale ochraceous, tomentose. *L. torminosus* (Schaeff.) Fr.
Pileus white, zoned and spotted with red, at first floccose. *L. controversus* (Pers.) Fr.

9. Pileus 6–20 cm., plane, flat; stipe tapering downward. *L. turpis* Fr.
Pileus 4–8 cm., convex, center depressed; stipe tapering upward. *L. sordidus* Pk.

SUBSECTION LIMACINI

1. Pileus sordid white; milk changing to lilac. 2.
Pileus some shade of yellow; milk unchanging. 3.
Pileus reddish flesh-color becoming paler; milk unchanging. *L. hysginus* Fr.
Pileus some shade of gray; milk unchanging. 5.

2. Pileus azonate, thin, fragile, 5–8 cm. *L. uvidus* Fr.
Pileus obscurely zonate or concentric-spotted, larger. *L. uvidus magnus* Pk.

3.	Pileus azonate; spores white.	*L. affinis* Pk.
	Pileus zonate or subzonate.	4.
4.	Stipe scrobiculate-spotted, hollow.	*L. insulsus* Fr.
	Stipe smooth, not spotted, solid.	*L. zonarius* (Bull.) Fr.
5.	Stipe spotted, hollow; pileus gray or grayish-lilac.	*L. maculatus* Pk.
	Stipe not spotted (or rarely so in *L. trivialis*).	6.
6.	Lamellae staining when wounded.	7.
	Lamellae not staining.	9.
7.	Pileus gray with pink or lilac shades; lamellae staining greenish.	8.
	Pileus gray with greenish shades; lamellae staining cinereous.	*L. blennius* Fr.
8.	Pileus 5–18 cm.; stipe 2.5–15 cm. long.	*L. trivialis* Fr.
	Pileus 2.5–5 cm.; stipe equal to or longer than diameter.	*L. trivialis gracilis* Pk.
9.	Lamellae and spores white; stipe 5–7 cm. long.	*L. cinereus* Pk.
	Lamellae and spores yellowish; stipe 4 cm. long.	*L. acer* (Bolt.) Fr.

New York Botanical Garden.

THE PITH CELLS OF PHYTOLACCA DECANDRA*

By Henry Kraemer

The structure of pith cells is so characteristic and so constant for certain species and genera, as was pointed out by Gris, that it will in all probability be found to have a taxonomic value in deciding the position of a number of more or less disputed genera and families. While the anomalous structure of the root, stem and leaves of certain species of *Phytolacca* has been more or less carefully studied, the pith cells of *Phytolacca decandra* are so marked in character as to warrant our attention in this connection.

The pith of this plant is unusually large, its diameter being about five sixths that of the entire stem. The active pith cells are more or less hexagonal in transverse section, the diameter being about three times that of a longitudinal section. The protoplasm lies near the walls and contains a number of chloroplastids and a single nucleus, and surrounding the latter are not infrequently a number of plastids. Some of the cells, which are either nearly isodiametric or considerably elongated, have the large vacuoles replaced by raphides and a small amount of mucilage. The

* Read before Section G of the American Association for the Advancement of Science, Pittsburg, July 3, 1902.

walls are thin and without pores, and consist, particularly the longitudinal walls, of lamellae of cellulose and cellulose-mucilage. The mucilaginous character of the wall may be readily detected in glycerin mounts of sections of material previously treated with alcoholic solution of methylene blue.

Usually between the sixth and eighth internodes from the top of the stem certain changes are observed in the character of the central pith cells. Some of the cells become more or less rounded in outline and appear to lose a part of their organized contents. The intercellular spaces become larger and with the subsequent breaking down of some of the cell walls, as well as the collapsing of some of the cells, large biconvex cavities are produced at quite regular intervals and extending to the lowest internode. These chambers are from one third to two thirds the width of the stem, and are from 1 to 4 mm. in depth. Separating these cavities are biconcave diaphragms consisting of cells similar to the other pith cells, only they contain small masses of mucilage and considerable protein matter, and in some of the cells the sap is replaced by air, giving the diaphragms a white appearance.

We have thus in *Phytolacca decandra* a pith differentiated into two parts, a peripheral portion made up of active cells, as already described, and a central portion consisting of biconcave diaphragms composed of both active and inactive cells, separated at regular intervals by cavities. The latter appear to be formed by the abstraction of water from the cells of this region as a result of the development of other parts of the stem. This view seems to be confirmed by the fact that in the process of drying that portion of the pith in the upper internodes, which is not already metamorphosed, becomes thus differentiated.

The central pith somewhat resembles the pith of certain xerophytic Compositae, and while the chambers might be looked upon as latent or neglected water reservoirs, still they do not seem to have this function.

The metamorphosed pith in *Phytolacca decandra* seems, on the one hand, to have a certain resemblance in origin to the hollow internodes of the stems of the Polygonaceae, and on the other hand to resemble the heterogeneous or modified pith of the

Magnoliaceae, with this difference, that the presence of lignin in the cells of the latter would tend to prevent the collapse and rupture of the cells to such a great extent.

The Chenopodiales being distinguished by an anomalous structure of stem and roots, as are also some of the Ranales, it is possible that a further study of the pith cells of these two orders together with those of the Polygonales will furnish additional ground for the position given these orders with reference to each other by the newer classification of Engler and Prantl.

Philadelphia College of Pharmacy.

SHORTER NOTES

A new Station for Isotria affinis.—Forty years ago, Mr. Austin discovered a new species of orchid at Closter, N. J. It was described in the fifth edition of Gray's Manual under the name *Pogonia affinis* Austin. It should now be known as *Isotria affinis* (Austin) Rydb., being a close relative of *Pogonia verticillata* (Willd.) Nutt., the type of the Rafinesquian genus *Isotria*. Specimens from Mr. Austin's original collection are the only ones that are found in the herbaria of the New York Botanical Garden and Columbia University. There are, however, records of two other stations, besides that at Closter, viz., one in Connecticut and one in southern New York. This summer, this exceedingly rare plant has turned up in an unexpected locality — at Burlington, Vermont. Mrs. Henry Holt, the rediscoverer, first wrote to Dr. Britton about her discovery and afterwards sent three fine photographs of the plant. On the back of one of these is found the following note: "Found in bloom on the first of June and did not fade till the ninth. Found in rich leaf mould with sand, at foot of old hemlock stump, in damp ground at foot of hill on our place. Ground had been cleared of quick growth of aspen, yellow birch, etc."

P. A. Rydberg.

New York Botanical Garden.

NEWS ITEMS

Dr. Tracy E. Hazen, for the past year director of the Fairbanks Museum, St. Johnsbury, Vt., has been appointed assistant in botany in Columbia University.

Dr. Alexander W. Evans, of Yale University, and Mr. Percy Wilson, of the New York Botanical Garden, have returned from a successful collecting expedition to Porto Rico. Most of their time was spent in the forest region of the Sierra de Luquillo.

Dr. N. L. Britton sailed for Liverpool on August 16, with the intention of spending two or three weeks at the Royal Gardens at Kew. He will give special attention to the study of the type specimens of certain American sedges preserved in the Kew herbarium.

Dr. Alexander P. Anderson has resigned his position as curator of the herbarium of Columbia University in order to devote himself to the economic and commercial development of his new method of treating cereal grains and starchy products. Several patents have recently been granted him by the United States government.

In the list of botanists visiting New York since July 1st may be noted Professors Charles H. Peck, of Albany, N. Y.; George Macloskie, of Princeton University; Edward L. Greene, of the Catholic University of America; A. S. Hitchcock, of the Bureau of Plant Industry, Washington; S. M. Coulter, of the Shaw School of Botany, St. Louis; D. S. Johnson, of Johns Hopkins University; James Fowler, of Queen's University, Kingston, Ontario; F. L. Stevens, of the North Carolina College of Agriculture and Mechanic Arts; and Harold L. Lyon, of the University of Minnesota.

OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

(1) BULLETIN

A monthly journal devoted to general botany. Vol. 28, published in 1901, contained 706 pages of text and 49 full page plates. Price $3.00 per annum. For Europe 14 shillings. Dulau & Co., 37 Soho Square, London, are agents for England.

Of former volumes, only 1–6 and 19–28 can be supplied entire from the stock in hand, but the completion of sets will be undertaken. Yearly volumes 1–5 (1870–1874), one dollar each. Vol. 6 (1875–1879), extending over five years, is furnished at the subscription price of five dollars. Vols. 19–27 (1882–1900) are furnished at the published price of two dollars each; Vol. 28, three dollars.

Single copies (30 cts.) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The MEMOIRS are published at irregular intervals. Volumes 1–7 and 9 are now completed and Nos. 1 and 2 of Vol. 8 and No. 1 of Vol. 11 have been issued. The subscription price is fixed at $3.00 per volume in advance. The numbers can also be purchased singly. A list of titles of the individual papers and of prices will be furnished on application.

(3) **The Preliminary Catalogue of Anthophyta and Pteridophyta** reported as growing within one hundred miles of New York, 1888. Price, $1.00.

Correspondence relating to the above publications should be addressed to

THE TORREY BOTANICAL CLUB
Columbia University
NEW YORK CITY

Vol. 2 October, 1902 No. 10

TORREYA

A Monthly Journal of Botanical Notes and News

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

MARSHALL AVERY HOWE

JOHN TORREY, 1796–1873

CONTENTS

Fossil Ferns from the Laramie Group of Colorado (*Plates 3 and 4*): Arthur Hollick 145
Caloglossa Leprieurii in Mountain Streams: Marshall A. Howe 149
A Key to the North American Species of Lactarius—II: F. S. Earle 152
Some New Mexico Plants: T. D. A Cockerell 154
A Visit to Okefinokee Swamp in southern Georgia: Roland M. Harper 156
Is the White-fruited Strawberry of Pennsylvania a Native Species? P. A. Rydberg 158
Shorter Notes:
A much-named Fungus: F. S. Earle 159
News Items 160

Published for the Club

At North Queen Street, Lancaster, Pa.

by The New Era Printing Company

THE TORREY BOTANICAL CLUB

OFFICERS FOR 1902

President,

HON. ADDISON BROWN, LL.D.

Vice-Presidents,

T. F. ALLEN, M.D. HENRY H. RUSBY, M.D.

Recording Secretary,

EDWARD S. BURGESS, PH.D.
Normal College, New York City.

Corresponding Secretary,

JOHN K. SMALL, PH.D.
Botanical Garden, Bronx Park, New York City.

Editor,

L. M. UNDERWOOD, Ph.D.,
Columbia University.

Treasurer,

FRANCIS E. LLOYD, A.M.
Columbia University.

Associate Editors,

NATHANIEL L. BRITTON, Ph.D. FRANCIS E. LLOYD, A.M.
CARLTON C. CURTIS, Ph.D. DANIEL T. MACDOUGAL, Ph.D.
MARSHALL A. HOWE, Ph.D. HERBERT M. RICHARDS, S.D.
ANNA MURRAY VAIL.

TORREYA is furnished to subscribers in the United States and Canada for one dollar per annum; single copies, fifteen cents. To subscribers elsewhere, five shillings, or the equivalent thereof. Postal or express money orders and drafts or personal checks on New York City banks are accepted in payment, but the rules of the New York Clearing House compel the request that ten cents be added to the amount of any other local checks that may be sent. Subscriptions are received only for full volumes, beginning with the January issue. Reprints will be furnished at cost prices. Subscriptions and remittances should be sent to Treasurer, Torrey Botanical Club, 41 North Queen St., Lancaster, Pa., or Columbia University, New York City.

Matter for publication should be addressed to

MARSHALL A. HOWE
New York Botanical Garden
Bronx Park, New York City

Vol. 2 No. 10

TORREYA

October, 1902

FOSSIL FERNS FROM THE LARAMIE GROUP OF COLORADO.*

By Arthur Hollick

(Plates 3 and 4)

Some twelve or thirteen years ago an extensive collection of fossil plants, from the Laramie (Upper Cretaceous) Group of Colorado, was made by Messrs. George Hadden and R. C. Hills, for the late Dr. J. S. Newberry. This collection is now in the paleobotanical museum of the New York Botanical Garden, and, although partly labeled, was never reported upon by Dr. Newberry.

Included in the collection are a few ferns, most of which are more or less rare and some of them apparently represent undescribed species or varieties. Of these the following have been selected as noteworthy:

Anemia supercretacea sp. nov.

General form of frond, also nervation, unknown; pinnae delicate, narrowly conical in outline, gradually tapering to the tips; pinnules entire, lower ones spatulate, distinct, somewhat decurrent along and forming acute angles with the rachis, upper ones often more pointed or becoming confluent and forming toothed or crenulated tips to the pinnae. Plate 3, Figs. 6, 7.

In reddish shaly sandstone, Florence, Colo.

Anemia robusta sp. nov.

General form of frond, also nervation, unknown; pinnae (?) linear in outline, about 3 cm. in width; pinnules entire, ovate to subspatulate, with blunt wedge-shaped tips, about 2.5 cm. in

* Read before the Botanical Society of America, Pittsburg Meeting, July 1, 1902.

[The exact date of publication of each issue of Torreya is given in the succeeding number. Vol. 2, No. 9, comprising pages 129–144, was issued August 30, 1902.]

length by 12 mm. in width, more or less confluent or decurrent along the rachis, each one provided with a weak midvein. Plate 3, Fig. 1.

In grayish sandstone, Florence, Colo.

ASPLENIUM MAGNUM Knowlton, Monog. U. S. Geol. Surv. **32**: 667. *pl. 79. f. 5–8a*

I have figured these specimens for the reason that they show some slight differences or variations from the type figured by Knowlton. In ours the pinnae are more deeply dissected, so that the pinnules are more distinctly separated and are merely confluent close to the rachis. They are also somewhat more pointed and falcate in outline. Plate 4, Figs. 1, 2.

In general appearance they both resemble *Aspidium Kennerleyi* Newb. (Boston Jour. Nat. Hist. **7**: 513. 1863; Monog. U. S. Geol. Surv. **35**: 11. *pl. 16. f. 4, 5.* 1898), which differs chiefly in the pinnules, for the most part, being finely denticulate near their extremities, although "sometimes entire," according to the description.

Fig. 1 in reddish shaly sandstone, Fig. 2 in black carbonaceous shale, Florence, Colo.

Acrostichum Haddeni sp. nov.

General form of frond unknown; pinnae (?) apparently 20 cm. or more in length by about 3 cm. in maximum width, narrowed to acute tips and with coarsely crenulate-serrate margins; nervation consisting of a series of alternate pinnately arrranged veins, extending from the rachis to the extremities of the serrations, with the spaces between occupied by a network of fine nerves. Plate 4, Figs. 3–6.

Named for Mr. George Hadden, the collector.

Figs. 3, 5 and 6 in grayish sandstone, Walsenberg Colo.; Fig. 4 in gray shale, Florence, Colo.

Polystichum Hillsianum sp. nov.

General form of frond unknown; pinnae (?) linear-oblong in outline, about 3 cm. in maximum width, narrowed to 18 mm. at the base, deeply pinnatifid; pinnules entire, linear to subfalcate in outline, blunt-pointed or obtuse at apex, alternately disposed and confluent along the rachis; nervation pinnate, consisting of

a series of primary nerves extending from the rachis to the extremities of the pinnules and numerous secondary nerves, once forked. Plate 4, Fig. 7.

Named for Mr. R. C. Hills, largely through whose efforts the collection was acquired.

In reddish shaly sandstone, Florence, Colo.

Gleichenia rhombifolia sp. nov.

General form of frond, also nervation, unknown; pinnae linear in outline, acute, about 5 mm. in width, composed of subquadrate pinnules, the lower ones distinct, acute and curved inward at the tips, the upper ones becoming confluent or closely approximated and all of nearly uniform length, giving to the pinnae a delicate, ribbon-like appearance. Plate 3, Fig. 3.

In reddish shaly sandstone, Florence, Colo.

GLEICHENIA DELICATULA Heer (?), Fl. Foss. Arct. 3^2: 54. *pl. 9. f. 11e; pl. 10. f. 16, 17*

This specimen agrees quite satisfactorily with Heer's Fig. 11e above quoted, but not so closely with his other figures, which show pinnae broader at their bases and not so uniform in width throughout as in ours. Further than this, if we determine these to be identical this determination would infer a very extensive vertical range for the species, a range which we would hardly be justified in assuming without question, upon such meager evidence as that afforded by the single fragment represented by our specimen, although there would be no inconsistency in identifying a species from the Kome beds with one from the Laramie. Plate 3, Fig. 4.

In reddish shaly sandstone, Florence, Colo.

PECOPTERIS (CHEILANTHES) SEPULTA Newb. (?) Monog. U. S. Geol. Surv. **35**: 12. *pl. 62. f. 5, 5a, 6.* 1898

Pecopteris (*Phegopteris*) *sepulta* Newb. Proc. U. S. Nat. Mus. **5**: 506. 1883.

After some hesitation I have finally decided to refer our specimen provisionally to this species. The differences are slight and the resemblance is so close that a distinction seems hardly to be warranted. Plate 3, Figs. 5, 5a.

Newberry's figures show the pinnae at the extremity of the frond to be either entire or wavy-margined and confluent along the rachis, while lower down they are subdivided into more or less distinct pinnules and are apparently separated from each other, although the basal pinnules are attached to the rachis.

The only difference on the part of our specimen is that the basal pinnules are free; but this may be and probably is due to its representing a yet lower portion of a frond than is depicted in either of Newberry's figures, which in themselves indicate a transition to a base similar to ours.

The reference to the Paleozoic genus *Pecopteris* will doubtless be criticised on general principles, but rather than add to the synonymy I have thought it best to adhere to the name last used by Dr. Newberry.

In grayish sandstone, Walsenberg (?),* Colo.

Stenopteris (?) cretacea sp. nov.

General form of frond unknown, but apparently large and strong; each pinna or branch consisting of a broad-winged rachis, with relatively remote, entire, strap-shaped pinnules, each of which is traversed by a strong midvein from base to apex; secondary nervation unknown.

The fragmentary nature of our specimen renders accurate comparison difficult and it is possible that it might equally well be considered under the genus *Thaumatopteris*, hence the generic reference is questioned.

In reddish shaly sandstone, Florence, Colo.

EXPLANATION OF PLATES

Plate 3. Fig. 1. *Anemia robusta* sp. nov.; Fig. 2. *Stenopteris* (?) *cretacea* sp nov.; Fig. 3. *Gleichenia rhombifolia* sp. nov.; Fig. 4. *Gleichenia delicatula* Heer (?); Figs. 5, 5*a*. *Pecopteris* (*Cheilanthes*) *sepulta* Newb. (?); Figs. 6, 7. *Anemia supercretacea* sp. nov.

Plate 4. Figs. 1, 2. *Asplenium magnum* Knowlton; Figs. 3–6. *Acrostichum Haddeni* sp. nov.; Fig. 7. *Polystichum Hillsianum* sp. nov.

NEW YORK BOTANICAL GARDEN.

* The label denoting the locality was not found, but the matrix is lithologically identical with that of the Walsenberg specimens.

FOSSIL FERNS FROM COLORADO.

FOSSIL FERNS FROM COLORADO.

CALOGLOSSA LEPRIEURII IN MOUNTAIN STREAMS

By Marshall A. Howe

In 1850, Dr. C. Montagne * described as new several species of red algae from mountain streams in French Guiana, referring three of them to the genus *Bostrychia*, one to *Gymnogongrus*, and one to *Ballia;* another species referred to the genus *Ballia* had already been described from the same region by Kützing. As the two last-named genera had been considered exclusively marine and as the members of the first-named, though typically inhabitants of brackish waters, were not elsewhere known to occur beyond the influence of the sea, Montagne naturally expressed surprise at the undoubted existence of these plants in running fresh water 40 kilometers or more from the sea and at altitudes ranging from 100 to 200 meters. But Montagne's species of *Gymnogongrus* has since become the monotype of a new genus *Sterrocladia*, placed in the fresh-water family Lemaneaceae, and the three species of *Bostrychia* have been considered by J. G. Agardh to be forms of a single species, *B. Moritziana*, previously described from the Antilles. Little has apparently been added to our knowledge of the two species referred to *Ballia.*

In the winter of 1890–'91, Professor K. Goebel collected four species of red algae — *Caloglossa Leprieurii* (Mont.) J. Ag., *Catenella impudica* (Mont.) J. Ag., *Bostrychia Moritziana* (Sond.) J. Ag. and *Bostrychia Calliptera* Mont. — on the roots of mangroves at the mouth of the Barima, British Guiana.† The surrounding water had not the slightest saline taste. Later, one of these species, *Bostrychia Moritziana*, was collected by Goebel in an inland cataract, and he considers its occurrence inland and in fresh water at the mouth of a river as evidence that this plant of marine affinities has gradually accustomed itself to water less and less brackish until it has finally become able to thrive in pure fresh water at a considerable distance from the sea, thus

* Ann. Sci. Nat. III. 14 : 283.

† Flora, 83 : 436–444. 1897.

answering in a measure Montagne's query as to how the algae described by him came to be in the mountains of French Guiana. Goebel then inquires why, of the four species found by him in fresh water at the mouth of the river, only one, *Bostrychia Moritziana*, appears to have wandered up-stream, alluding, however, to the reported occurrence of *Caloglossa Leprieurii* far up the Hudson River [at West Point].* He remarks upon the incompleteness of our knowledge of the interesting stream-flora of Guiana and considers it not at all improbable that one or another of the three other species named, for example, the *Delesseria* [*Calogossa*], may yet be found to have wandered inland. Already, however, nine years before Goebel's notes were published, Dr. Ferdinand Hauck had reported † the occurrence of *Caloglossa Leprieurii* on stones in a brook in the Sierra de Luquillo of Porto Rico. There, also, it was recollected on July 20, 1902, by Mr. Percy Wilson, of the New York Botanical Garden, who states that it was abundant on stones in a single stream but was not noticed in other streams of the region. The locality was about 12 kilometers from the sea, and the elevation, according to estimates by Mr. Wilson and by Professor A. W. Evans, of Yale University, may be conservatively placed at from 400 to 500 meters. The water, as would be expected, was entirely fresh to the taste. The specimens agree perfectly with those collected in the same mountains by Sintenis and referred to *Caloglossa Leprieurii* by Hauck. The species was originally described by Montagne‡ from two specimens collected in French Guiana, one growing on maritime rocks near Cayenne, the other creeping on culms of grasses reached by the high tide not far from the mouth of the river Sinnamari. The Porto Rican specimens are wholly sterile, so far as the writer can discover, and there seems to be no reliable way of distinguishing them specifically from a specimen of *Caloglossa Leprieurii* from Cayenne — evidently typical, if not an actual co-type — in the herbarium of Columbia Univer-

* Mr. George Skene, of the New York Botanical Garden, is authority for the statement that the water of the Hudson River at West Point is, at flood tide, decidedly salt to the taste.

† Engler's Bot. Jahrb. 9 : 461. 1888.

‡ Ann. Sci. Nat. II. 13 : 196. 1840.

sity. The Porto Rican fresh-water plants are, however, somewhat narrower and the cells are slightly larger. Adventitious branches from the dorsal surface at the nodes are found in plants from both regions, but are met with more frequently in those from Porto Rico.

Caloglossa Leprieurii, as commonly understood, has a wide distribution, ranging northward from South America to the Hudson River, occurring chiefly in tidal rivers. As collected about New York and at West Point, it is considerably narrower than the type, but does not seem to differ otherwise. Specimens taken at West Point were identified as "*Delesseria Leprieurii*" by Montagne himself according to a note by Professor J. W. Bailey in the Columbia University herbarium. What has been believed to be the same species has been attributed at various times to New Zealand, Ceylon, Calcutta, and other distant parts of the world. And three species of this genus, more or less resembling *C. Leprieurii*, have been described from fresh water, viz., *Caloglossa Beccarii* (Zanard.) De-Toni, from Borneo; *C. Amboinensis* (G. Karst.) De-Toni, from the island of Amboina; and *C. Zanzibariensis* (Goebel) De-Toni from Zanzibar. As all the other members of the family to which *Caloglossa* belongs are exclusively marine, so far as is known, it seems fair to assume that all the species or forms of this genus inhabiting pure fresh water have had a marine origin in times comparatively recent from the evolutionary point of view. Karsten,* in discussing his Amboina plant from this standpoint states that the streams in which he collected it (at an altitude, often of "mehrere hundert Fuss") have a rapid fall to the sea and offer a transition in salinity too abrupt to be readily overcome. Therefore, instead of assuming a direct wandering up-stream under conditions practically such as exist at present, he suggests the possibility that the plant has been lifted out of the ocean in the course of the elevation of the island itself. In Amboina, an abundance of coralline blocks at an altitude equal to that of the *Caloglossa* stand as witnesses that an elevation of the island has taken place. Goebel, however, in discussing the biological relations of *Bostrychia Moritziana*,

* Bot. Zeit. 49 : 270. 1891.

assumes a direct migration inland, the plant becoming gradually accustomed to a decreasing salt-content of the water, and aquatic animals, birds, etc., being the agents by which dissemination up stream beyond the reach of the tide is accomplished.

Caloglossa Leprieurii has been made the subject of an able and detailed morphological monograph by the late Professor Cramer, of Zurich, based upon material from New York and Ceylon. It may be remarked incidentally that this plant is a most elegant object, from the pedagogical standpoint, for the demonstration and study of the development of a thallus from an apical cell.

A KEY TO THE NORTH AMERICAN SPECIES OF LACTARIUS—II*

By F. S. Earle

Subsection Piperati

1.	Milk white, changing to cream-color or yellow.	2.
	Milk white, unchanging.	3.
2.	Pileus yellowish-white, tomentose; stipe solid, velvety.	*L. subvellereus* Pk.
	Pileus yellowish flesh-color, spotted; stipe hollow, glabrous.	*L. chrysorrheus* Fr.
3.	Pileus white or whitish or tinted.	6.
	Pileus reddish-brown, 1–2.5 cm.; stipe white.	*L. parvus* Pk.
	Pileus grayish-brown, with shades of lilac.	4.
	Pileus dark brown, fuliginous or umbrinous.	5.
	Pileus dark green, very acrid.	*L. atro-viridis* Pk.
4.	Lamellae distant, yellowish, not staining.	*L. pyrogalus* (Bull.) Fr.
	Lamellae crowded, flesh-color, staining greenish.	*L. varius* Pk.
5.	Pileus convex-umbilicate, rivulose-floccose; stipe 2.5 cm.	*L. umbrinus* (Pers.) Fr.
	Pileus infundibuliform, dry, not polished; stipe 3–8 cm.	*L. plumbius* (Bull.) Fr.
6.	Pileus villous or tomentose, at least on the margin.	7.
	Pileus glabrous.	10.
7.	Lamellae crowded.	8.
	Lamellae distant.	9.
8.	Pileus white, then orange, silky-villous.	*L. villosus* Clem.
	Pileus white to pale ochracous, glabrate, margin silky.	*L. involutus* Soppitt
9.	Pileus white, persistently tomentose; spores nearly smooth.	*L. vellereus* Fr.
	Pileus white, often spotted, becoming glabrate; spores rough.	*L. deceptivus* Pk.

* Continued from page 141.

10. Lamellae densely crowded, narrow. 11.
Lamellae distant or subdistant, broader. 12.

11. Stipe long, 5–10 cm., slender, stuffed; lamellae horizontal. *L. pergamenus* (Swartz) Fr.
Stipe short, 2–5 cm., thick, solid; lamellae arcuate. *L. piperatus* (Scop.) Fr.

12. Pileus thin, 3–7 cm., pure white. *L. albidus* Pk.
Pileus thick, larger, reaching 15–20 cm., tinted flesh-color. 13.

13. Stipe short, 3–4 cm., solid. *L. flexuosus* Fr.
Stipe long, 10–15 cm., hollow. *L. platyphyllus* Pk.

Section Dapetes

1. Milk blue. *L. Indigo* (Schw.) Fr.
Milk some shade of red or yellowish-red. 2.

2. Pileus white, dry, velvety. *L. salamoneus* Pk.
Pileus orange, zonate, viscid. *L. deliciosus* (L.) Fr.
Pileus some shade of gray with blue, green or purple shades. 3.

3. Milk reddish-brown; flesh unchanging. *L. subpurpureus* Pk.
Milk reddish-yellow; flesh changing to blue or green. *L. Chelidonium* Pk.

Section Russularia

1. Pileus viscid. 2.
Pileus squamulose, tomentose or pruinose, at least when young. 4.
Pileus polished, glabrous from the first. 16.

2. Milk white, changing to yellow. *L. thejogalus* (Bull.) Fr.
Milk white, unchanging. 3.

3. Pileus 5–8 cm., reddish-brown or nearly cinnamon. *L. quietus* Fr.
Pileus 6–15 cm., pallid, pale yellowish or reddish. *L. pallidus* (Pers.) Fr.

4. Milk white, changing to yellow; pileus brown. *L. subtomentosus* B. & Rav.
Milk white, changing to red;* pileus pallid, pruinose. *L. fuliginosus* Fr.
Milk white, unchanging. 5.

5. Lamellae distant. 6.
Lamellae more or less crowded. 8.

6. Pileus fuliginous; lamellae white. *L. Gerardii* Pk.
Pileus yellowish-red or yellowish-brown; lamellae yellowish. 7.

7. Pileus small, 4 cm., yellowish-red, pulverulent. *L. hygrophoroides* B. & C.
Pileus larger, 5–10 cm., yellowish-brown, tomentose. *L. distans* Pk.

8. Pileus pruinose, not at all pubescent. 9.
Pileus at first pubescent, then glabrate. 10.
Pileus persistently pubescent or squamulose. 12.

9. Pileus milky brown then reddish-orange; stipe orange. *L. saccharinus* Johns.
Pileus dull yellow; milk very abundant, staining the plant. *L. luteolus* Pk.
Pileus fuliginous, plicate-rugose, 5 cm. or more. *L. lignyotus* Fr.
Pileus fuliginous, plicate-rugose, 2.5 cm.; stipe only 4 mm. thick. *L. lignyotus tenuipes* Pk.

* *Lactarius lignyotus* in Europe is said to have milk turning reddish, but the American plants that have been referred to this species do not have this character.

10. Pileus infundibuliform, bay-red; spores 6–8 μ. *L. rufus* Fr.
Pileus plane or subdepressed, golden brown; spores 8–10 μ. 11.

11. Pileus smooth, soon glabrate. *L. volemus* Fr.
Pileus rugose-reticulate, especially on the margin. *L. volemus subrugosus* Pk.

12. Pileus rugose-reticulate, dark chestnut; spores 10–12 μ. *L. corrugis* Pk.
Pileus smooth, not rugose-reticulate. 13.

13. Stipe concolorous. 14.
Stipe of a different color from the pileus. 15.

14. Pileus and stipe grayish-white, small, 1–4 cm. *L. griseus* Pk.
Pileus and stipe reddish-allutaceous, larger, 8–15 cm. *L. aquifluus* Pk.

15. Pileus grayish-brown, often violet-tinted, 2.5–8 cm.; stipe pallid, pubescent. hollow or stuffed. *L. glycyosmus* Fr.
Pileus olivaceous, 2.5 cm.; stipe white, solid. *L. alpinus* Pk.

16. Stipe white; pileus brown; milk none [*Russula?*].
L. illachrymans B. & Rav.
Stipe concolorous or subconcolorous. 17.

17. Flesh white, changing to brownish flesh-color. *L. fumosus* Pk.
Flesh not changing color. 18.

18. Stipe with white strigose hairs at base. *L. paludinella* Pk.
Stipe glabrous or subpruinose. 19.

19. Pileus golden or golden brown; stipe orange. *L. mitissimus* Fr.
Pileus some shade of reddish-brown or chestnut. 20.

20. Milk scanty, color of watered silk; stipe solid. *L. serifluus* (DC.) Fr.
Milk white, not watery. 21.

21. Pileus hygrophanous, zonate when moist, azonate when dry, 5–10 cm.
L. mutabilis Pk.
Pileus not hygrophanous. 22.

22. Pileus subzonate, aromatic, especially on drying. *L. camphorarus* (Bull.) Fr.
Pileus azonate, not aromatic. 23.

23. Pileus reddish-brown, margin even; stipe subpruinate. *L. subdulcis* (Bull.) Fr.
Pileus bay-red, shining, margin inflexed, crenulate. *L. subdulcis badius* Gillet
Pileus cinnamon-red, somewhat shining. *L. subdulcis cinnamomeus* Gillet
Pileus dull chestnut-red. *L. subdulcis rufus* Gillet

New York Botanical Garden.

SOME NEW MEXICO PLANTS

By T. D. A. Cockerell

Astragalus simulans sp. nov.

Similar to *A. mollissimus* in general appearance and manner of growth. Leaves about 150 cm. long, pinnate, with 8–13 pairs of oval leaflets, about 14 mm. long and 8 broad, silvery on both

sides with long appressed white hairs. Flowers about 15–18 in a head about 50 mm. long, on pedicels about 2.5 mm. long, with hairy linear bracts about 7 mm.; flower about 17 mm. long and only 5 broad; calyx hairy, its tube about 8 mm. with five linear lobes about 5 mm. Standard narrow, the sides folded upwards, the expanded portions all deep magenta, the hidden whitish. Wings long and narrow, surpassing keel by nearly 3 mm., magenta, with the terminal portion broadly white. Keel pale magenta with the margin whitish, apex deeply emarginate. One free stamen. Peduncles densely white-hairy, the pubescence subappressed and interwoven. Pod oblong, thick, pointed, about 20 mm. long, 6.5 broad, 5 high, curved upwards, sulcate (not very deeply) only on dorsal side, more or less speckled with red, sometimes so much as to appear red except basally, quite glabrous, 2-celled by the intrusion of the dorsal suture, which touches but does not unite with the ventral. Pods on pedicels about 3 mm. long.

Stony hills at Las Vegas, New Mexico, growing in clumps, May 18, 1901 (*T. D. A.* and *W. P. Cockerell*). The fruiting stems become at length depressed and buried in the soil. At the same place grow *Astralagus accumbens* Sheld. and *Potentilla subviscosa* Greene, these kindly identified for me by Dr. Rydberg. The type of *A. simulans* is in herb. N. Y. Botanical Garden.

Aragallus pinetorum Veganus var. nov.

Similar to *A. pinetorum* Heller (1899), but only 1.5–1.75 dm. high, and the flowers white, the keel with a pair of large purple blotches within, showing through to the outside; middle of standard with a pair of faint purple patches.

Heller's larger plant, with white unspotted flowers, occurs at a much lower altitude, in the pine region. *A. pinetorum Veganus* was very abundant in one locality only, an exposed treeless limestone outcrop on the top of the Las Vegas Range, above the Sapello Canyon at about 11,000 feet. It was discovered on June 26, 1901, by Mr. Fabian Garcia, and on the following day I spent some time on the spot studying the plants. The flowers were observed to be visited by *Bombus* and by *Pyrameis cardui*, while the beetle *Cantharis Nuttallii* was feeding on the leaves. The type of *A. p. Veganus* is in the herb. N. Y. Botanical Garden; I am indebted to Dr. Rydberg for the recognition of its relationship with *A. pinetorum* of Heller.

The following plants also were collected on the top of the Las Vegas Range (11,000 feet), and have been determined by Dr. Rydberg: *Ranunculus micropetalus* (Greene) Rydb.; *Draba streptocarpa*, A. Gray, alpine form; *Anemone globosa* Nutt.; *Saxifraga austromontana* Wiegand; *Androsace pinetorum* Greene; *Polemonium delicatum* Rydb., unusually large; *Antennaria aprica* Greene. Most of them, at least, must be new to the flora of New Mexico.

Parosela Jamesii (T. & G.) Vail.—Coulter, in the Botany of Western Texas, says of this species: "flowers purple with a yellowish standard." In the Wheeler Survey Botany the petals are said to be yellowish or rose-color, scarcely exceeding the calyx. As a matter of fact, the flowers are entirely bright canary-yellow, turning ferruginous as they fade. The keel much exceeds the calyx. The plant is very common at Las Vegas, N. M., flowering early in June. Las Vegas specimens have been carefully compared with the type of *P. Jamesii* by Miss A. M. Vail, and she writes me that there is no difference whatever; "the type has yellow flowers, some of the petals of which have faded into a brown or reddish." Perhaps the publication of this note may prevent some one from publishing *P. Jamesii* as a new species, misled by the descriptions.

East Las Vegas, N. M.

A VISIT TO OKEFINOKEE SWAMP IN SOUTHERN GEORGIA

By Roland M. Harper

(*Extracted from a Letter to Dr. John K. Small.*)

I suppose you received my card from Folkston? The afternoon of the next day Mr. Ricker and I entered the great Okefinokee, with a boat and a guide. We spent forty-five hours in the swamp, and to say that I was surprised and delighted is putting it mildly. It is certainly very different from what I expected. There is no danger or difficulty about it at all. We went in on the canal about eleven miles, which took us nearly to the middle of the swamp.

I was much pleased to find that the destruction of the swamp has been at a standstill for several years, and the flora has been scarcely injured. The sawmill is falling to decay and the canal is filling up with vegetation, such as *Eleocharis elongata*, *Pontederia*, etc. There are many sunken boats in it, of all sizes from steamboats down. The outside part of the canal is completed to the river, but the water in it runs into the swamp instead of out of it. The canal has had a tendency to make the swamp drier in places, however, by allowing the water to flow more freely.

The big game in the swamp was conspicuously absent. We saw one snake and one alligator (killed the former), but nothing bigger. The one thing that bothered us was mosquitoes, and those only at night.

I had naturally expected the swamp to be a dark gloomy place, but it is nothing of the kind. The only tree which is at all abundant is *Taxodium imbricarium* (see June *Bull. Torrey Club*), which does not give much shade; and a great deal of the swamp (at least on the east side, the west side is said to be denser) is open prairie.

The flora is much like that of any cypress pond, with variations and additions. I don't believe I found any new species in the swamp, but I got some new facts about some of the old ones. I doubt very much if there are any endemic species in Okefinokee, for from all appearances the swamp has not been in existence long enough to produce specific differences. Some of the things I got are probably varietally distinct, however.

You will be surprised to learn that *Sarracenia minor* is one of the commonest species in Okefinokee. Its name is very inappropriate there, for the leaves are rarely less than two feet long, and we measured one which was 44 inches long. In some places there are acres of *Woodwardia Virginica* with 99 per cent. of the fronds facing east (at least in the morning; perhaps they turn with the sun). We saw only four ferns in the swamp by the way, two Osmundas and two Woodwardias. We didn't even see *Polypodium polypodioides* or any epiphyte except *Tillandsia usneoides*, which grows on every tree.

Among the surprises in the swamp is a shrub which Chapman describes (if I have identified it correctly) as two or three feet high, I believe, but in Okefinokee it often climbs trees twenty or thirty feet, by a new and unheard of method, without twining, tendrils, rootlets, or anything of the kind. The shrub I make out to be *Andromeda phillyreaefolia*, and the single tree which it climbs is one which has never had any parasites, epiphytes, or anything else reported from it; viz., *Taxodium imbricarium*.

From what I have read of Dismal Swamp and seen of Okefinokee I should judge that there is some little similarity between them, but I think Okefinokee is superior from a botanical standpoint. It contains many undescribed kinds of plant communities.

BRUNSWICK, GEORGIA, August 14, 1902.

IS THE WHITE-FRUITED STRAWBERRY OF PENNSYLVANIA A NATIVE SPECIES?

BY P. A. RYDBERG

In 1898, Mr. C. L. Gruber, of Kutztown, Pa., sent to Dr. Britton specimens of the so-called white-fruited strawberry of Pennsylvania. In his letter Mr. Gruber wrote among other things, the following: "The berries are cream-color, of an excellent peculiar flavor unlike other strawberries, globular, flattish-globular, or conical, usually with a very short neck."

As the specimens sent were so like the European *Fragaria vesca* that I could not find any other difference than the color of the fruit and perhaps a little more glaucous lower surface of the leaves, I thought that the specimens represented some escaped white-fruited form of the cultivated "Alpine" strawberries. In my monograph of the North American Potentilleae I therefore took up the Linnaean name *Fragaria vesca alba* and applied it to the Pennsylvania plant.

At the recent meeting of the A. A. A. S. at Pittsburg I met two persons well acquainted with the flora of western Pennsylvania, viz., Mr. Shafer, of the Carnegie Museum, and Mr. O. P. Medsger, of Jacobs Creek, and both thought that the strawberry was

a native, as it is common in southwestern Pennsylvania, eastern Ohio and northern West Virginia. That it has been cultivated in the region is true, for Mr. Medsger writes to me: "My father informs me that when he was a boy nearly sixty years ago, this strawberry was about the only form cultivated in the gardens. At that time perhaps most of the strawberries now cultivated were unknown." This, however, does not solve the mystery of its origin, and any information in this line will be highly appreciated. The true *Fragaria vesca* L. is not found wild in this country and is very rare even as an escaped plant, probably because it is seldom cultivated. Its American representative, *F. Americana*, has nothing to do with the white-fruited strawberry. The fruit of the former has a long neck devoid of achenes, which is not the case with the latter. Mr. Medsger has sent me fine fruits of the Pennsylvania plant and these are essentially those of *F. vesca*. The achenes in the mature fruit are wholly superficial, the receptacle not even bearing a trace of being pitted, and the sepals are spreading. The fruits are most of them almost spherical, some only slightly elongated.

New York Botanical Garden.

SHORTER NOTES

A much-named Fungus.—I am obliged to Mr. Shear* for calling my attention to the error made by Professor Tracy and myself in overlooking Cooke and Ellis' *Fusicladium fasciculatum* when we proposed the name *Scolecotrichum euphorbiae* for a commonly occurring fungus on different species of *Euphorbia*. As Mr. Shear points out there can be no question of the identity of the two and the specific name given by us must drop into synonymy. Unfortunately, however, other errors must be acknowledged. In *Muhlenbergia*, 1: 16. Au. 1901, I proposed the new genus *Cercosporidium* founded on this species as the type. A further examination of this material and of the numerous European specimens of *Passalora bacilligera* (Mont. & Fr.)

* Bull. Torrey Club, 29: 449. Jl. 1902.

Fresenius, the type of the genus *Passalora* Fr., in the herbarium of the New York Botanical Garden, convinces me that the two are not generically distinct. Both are biophilous, and have long, pannose, fasciculate, fuscous conidiophores, which bear the once or more septate oval or ovate conidia both acrogenously and pleurogenously. Adopting this view of the case, the name and synonymy of our fungus will stand as follows:

Passalora fasciculata (C. & E.).

Syn.: *Fusicladium fasciculatum* C. & E. Grevillea, **6**: 88. Mr. 1878.

Scolecotrichum euphorbiae Tracy and Earle, Bull. Torrey Club, **23**: 209. My. 1896.

Piricularia euphorbiae Atkinson, Bull. Cornell Univ. **3**: 40.

Cercosporidium euphorbiae Earle, Muhlenbergia, **1**: 16. Au. 1901.

Scolecotrichum fasciculatum Shear, Bull. Torrey Club, **29**: 449. Jl. 1902.

CERCOSPORIDIUM HELLERI Earle, Muhlenbergia, **1**: 16 should also be changed to **Passalora Helleri** (Earle).

F. S. EARLE.

NEW YORK BOTANICAL GARDEN.

NEWS ITEMS

Dr. N. L. Britton returned on September 13 from a visit to England.

Mr. J. A. Shafer, curator of the herbarium of the Carnegie Museum, Pittsburg, Pa., spent the month of September at the New York Botanical Garden; and H. Harold Hume, of the Florida State Agricultural College, has recently devoted a week to consulting its library.

"Forage Conditions on the northern Border of the Great Basin" by Dr. David Griffiths, "Stock Ranges of northwestern California" by Mr. Joseph Burtt Davy, and "The North American Species of *Spartina*" by Mr. Elmer D. Merrill, are titles of bulletins recently issued by the Bureau of Plant Industry.

OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

(1) BULLETIN

A monthly journal devoted to general botany. Vol. 28, published in 1901, contained 706 pages of text and 49 full page plates. Price $3.00 per annum. For Europe 14 shillings. Dulau & Co., 37 Soho Square, London, are agents for England.

Of former volumes, only 1–6 and 19–28 can be supplied entire from the stock in hand, but the completion of sets will be undertaken. Yearly volumes 1–5 (1870–1874), one dollar each. Vol. 6 (1875–1879), extending over five years, is furnished at the subscription price of five dollars. Vols. 19–27 (1882–1900) are furnished at the published price of two dollars each; Vol. 28, three dollars.

Single copies (30 cts.) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The MEMOIRS are published at irregular intervals. Volumes 1–7 and 9 are now completed and Nos. 1 and 2 of Vol. 8 and No. 1 of Vol. 11 have been issued. The subscription price is fixed at $3.00 per volume in advance. The numbers can also be purchased singly. A list of titles of the individual papers and of prices will be furnished on application.

(3) **The Preliminary Catalogue of Anthophyta and Pteridophyta** reported as growing within one hundred miles of New York, 1888. Price, $1.00.

Correspondence relating to the above publications should be addressed to

THE TORREY BOTANICAL CLUB
Columbia University
NEW YORK CITY

Vol. 2 November, 1902 No. 11

TORREYA

A Monthly Journal of Botanical Notes and News

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

MARSHALL AVERY HOWE

JOHN TORREY, 1796–1873

CONTENTS

Field Notes on Rhododendron Catawbiense: W. A. Cannon 161
A Key to the North American Species of Cortinarius—I: F. S. Earle 169
Two new Species of Selaginella in the Southern Flora: L. M. Underwood.... 172
Vacation Observations—I: Francis E. Lloyd..... 173
Shorter Notes:
Note on the "Report of the Brown-Harvard Expedition to Nachvak, Labrador": M. A. Howe..... 175
The Habitat of the slender Cliff-brake: Tracy E. Hazen..... 176
News Items..... 176

Published for the Club

At North Queen Street, Lancaster, Pa.

by The New Era Printing Company

THE TORREY BOTANICAL CLUB

OFFICERS FOR 1902

President,

HON. ADDISON BROWN, LL.D.

Vice-Presidents,

T. F. ALLEN, M.D. HENRY H. RUSBY, M.D.

Recording Secretary,

EDWARD S. BURGESS, PH.D.
Normal College, New York City.

Corresponding Secretary,

JOHN K. SMALL, PH.D.
Botanical Garden, Bronx Park, New York City.

Editor,

L. M. UNDERWOOD, Ph.D.,
Columbia University.

Treasurer,

FRANCIS E. LLOYD, A.M.
Columbia University.

Associate Editors,

NATHANIEL L. BRITTON, Ph.D. FRANCIS E. LLOYD, A.M.
CARLTON C. CURTIS, Ph.D. DANIEL T. MACDOUGAL, Ph.D.
MARSHALL A. HOWE, Ph.D. HERBERT M. RICHARDS, S.D.
ANNA MURRAY VAIL.

TORREYA is furnished to subscribers in the United States and Canada for one dollar per annum; single copies, fifteen cents. To subscribers elsewhere, five shillings, or the equivalent thereof. Postal or express money orders and drafts or personal checks on New York City banks are accepted in payment, but the rules of the New York Clearing House compel the request that ten cents be added to the amount of any other local checks that may be sent. Subscriptions are received only for full volumes, beginning with the January issue. Reprints will be furnished at cost prices. Subscriptions and remittances should be sent to Treasurer, Torrey Botanical Club, 41 North Queen St., Lancaster, Pa., or Columbia University, New York City.

Matter for publication should be addressed to

MARSHALL A. HOWE
New York Botanical Garden
Bronx Park, New York City

Vol. 2 No. 11

TORREYA

November, 1902

FIELD NOTES ON RHODODENDRON CATAWBIENSE

By W. A. Cannon

On Roan Mountain, North Carolina, occur four kinds of laurel, namely, the flame-colored azalea (*Azalea lutea*), the great laurel (*Rhododendron maximum*), the mountain laurel (*R. Catawbiense*) and the American or ivy laurel (*Kalmia latifolia*). I had a good opportunity to observe these plants, especially the mountain laurel, while spending the season collecting plants from the middle of June until October 1902, on the summit of Roan, and since these observations were made with comparative difficulty, it may be considered an economical measure, to record them; it is to be hoped that the facts presented although fragmentary, may not of themselves be without interest.

Where the Laurels grow

When in June a visitor to Roan alights from the train at the nearest railway station * and looks about him, he will have little difficulty in seeing the American laurel, or "ivy" as it is called by the mountaineers, which at the time is in full bloom. This rather ornamental shrub is striking and beautiful, indeed, when covered with its pink flowers. It may be seen on the banks of the Doe River all the way to the foot of the mountain, which is about 1,000 feet above the station and five miles distant from it, but it is not so abundant at a higher altitude although to be observed at 4,500 feet altitude.

Associated with the American laurel is to be found the great

* Roan Mountain on the East Tennessee and Western North Carolina R. R., 2,700 feet altitude, fifteen miles from the summit of Roan.

[The exact date of publication of each issue of Torreya is given in the succeeding number. Vol. 2, No. 10, comprising pages 145–160, was issued September 30, 1902.]

laurel, but not in flower in the middle of June; it does not blossom before July. Like the American laurel, this species, as a rule, does not occur in the higher altitudes.

Both of the species just mentioned may be seen from the wagon road going to the top of Roan, but the other two occur only on the summit, or in places more or less remote from the main traveled way. I know of only two places about five miles apart on Roan, where the flame-colored azalea grows, and there it is represented by only a few specimens. In both cases the altitude is above 5,000 feet. I presume, however, it may occur in lower altitudes and in favorable, that is, warm locations.

When, on the way to the summit of Roan, Carver's Gap with an altitude of 5,400 feet is reached, the road turns sharply to the westward and ascends in several "switchbacks" through a second-growth and open balsam forest nearly to the top of Roan High Knob, which it skirts on the way to the hotel (Cloudland). It is on the side of the High Knob, among the groups of balsams, that the visitor gets his first glimpse of the mountain laurel. This is in blossom in June. The rounded shrubs, about six feet high, are covered with bouquet-like clusters of large lilac-purple flowers, which are richly set among the dark green leaves. As the hotel is reached, or, better still, if Roan High Knob is ascended, the visitor gets such a view as he is likely not soon to forget. Some distance to the westward on a rounded lower summit a huge bed of rhododendron spreads out which mounts by an easy incline to the other high eminence, Roan High Bluff. In the distance the individuality of each plant is lost, and the massing of the blossoms of thousands of shrubs produces a wealth of color on the summit, beautiful beyond description.

The leading Plant Formation on Roan

But not every rhododendron even in fruitful years is so richly laden as those just described. The abundance of flowers is primarily associated with the local distribution of the shrub, and also with other facts of significance in its biology, as with its form and duration of life. In order better to understand this, and also before going further into the subject, it may be best to

glance at the main plant formations on the mountain namely, forest, shrub and meadow.

There are two kinds of forests, deciduous and coniferous. The former, as a rule, occupies the lower reaches of the mountain, but may extend upward to an altitude of perhaps 5,800 feet. The coniferous forest, the dominant trees being Frazer's balsam and the black spruce, is found on the uppermost slopes only, extending downward into the gulches or on the northern side for a considerable distance.

The rounded summits of Roan are mainly covered either with shrubs or meadows. The shrub formation is composed of a low

FIG. 1. *Rhododendron Catawbiense* growing with *Dendrium buxifolium prostratum*. The illustration shows the rounded outlines characteristic of this rhododendron.

alder, the rhododendron (*R. Catawbiense*) and the small heather (*Dendrium buxifolium prostratum*). The two former are the dominant plants, and generally these are not mixed but occur in separate areas. Between the alders and the forest the line is sharply drawn. But between the rhododendrons and the forest this is not the case and they may grow in the more open balsam woods. While small plantations of rhododendron occur here and there in the open throughout the upper reaches of the mountain, the largest area exclusively occupied by it lies between Roan High Knob and Roan High Bluff and comprises perhaps 80 acres. This is the formation which in June is so conspicuous with its mass of flowers.

The Form of R. Catawbiense

If we examine a rhododendron shrub, which is growing in the large plantation just referred to, or in any location away from the forest, and compare it with a form growing among the balsams we see certain variations in the plants themselves characteristic of the different habitats. In the first place, the shrubs in the open are not so tall, measuring 2–7 feet; they are more rounded in outline; they are more dense and branch much more richly; and in addition they flower more abundantly. The shrubs among the trees, on the other hand, are often tall, slender and extremely irregular in form, they branch but little, and they flower rela-

Fig. 2. *Rhododendron Catawbiense* with young shoots or suckers springing from the base of its branches.

tively seldom. As an example of the habit of the latter I may cite a plant of which one branch was over seven feet high and unbranched, and which had not borne a flower.

As will presently appear, the variation in habit just mentioned lies primarily in the characteristic difference in the number of flowers borne, and in the relation of the flowers to the axes of the plant.

A mature rhododendron shrub has no main stem with lateral branches, but on the contrary, is composed of several shoots likely of coördinate rank, which are of themselves branches, and

each of which may branch several times before terminating in the ultimate twigs upon which the flowers and leaves appear.

The flowers are arranged in umbels, they are terminal, and in each case they end the growth of the twig.

The leaves of each branchlet are in one, two, or rarely three interrupted groups, from four to six leaves each. The variation in the number of groups of leaves is correlated with the differences in the habitat of the plants, and varies with the time of year. Uniformly the shrubs growing among the balsams have at least one or two groups of leaves more than those away from the forest, or, in other words, the leaves on such shrubs may live one year or more longer than those on the open growing plant. In the axils of the leaves are buds, each or all of which may develop, or, as will be shown later, they may remain latent. If two or more buds grow, the respective branches which they form make a more or less wide angle with the parent branch ; if, on the other hand as perhaps most frequently happens, one only develops, the new branch turns upward and takes a direction parallel to that of the parent, pushing the flower cluster, now become the fruit, to one side. Sometimes it happens that none of the axillary buds develop, in which case of course the branch either retains its integrity, or if the terminal bud is a flower-bud, the branchlet dies. Now it happens that if a leaf-bud terminates a branchlet, the development of the axillary buds appears to take place much less frequently than when the terminal bud is destined to give rise to flowers. It thus happens that profuseness in flowering brings about wealth of branching, and since the plants in the open blossom more than in the forest, that the former are also more abundantly branched.

A peculiarity which the rhododendron grown in the open shows as regards the branching, accounts also for the rounded outline characteristic of such forms. This shape is so noticeable that, as suggested by a visitor to the mountain, the shrubs appear as if they were cropped by grazing cattle. So far as I have observed, however, they are not subject to their attack. Rather the symmetrical form is occasioned by the nearly equal and similar development of its constituent branches.

The Duration of the Life of the Rhododendron

We may now turn to examine the causes which determine the life limit of the average rhododendron shrub, but before doing so it will perhaps be best to review briefly the structure of the buds, both leaf and flower.

An examination of the rhododendron in August or early September, shows that the flower and leaf buds for the following year's growth are already formed, and are easily to be distinguished. The flower bud is much the larger, being about three quarters of an inch long, and relatively stout. A longitudinal section shows that the young flowers are each subtended by a relatively long bract, and that the young cluster itself is enclosed by several

Fig. 3. Branches of *Rhododendron Catawbiense* which have been cut across slightly below the surface of the ground. Young shoots springing from basal buds are shown.

overlapping scales. When the flower bud develops the latter fall away, as do the bracts also, and the basal portion of the growing flower stalk is left quite naked.

In August the leaf-bud is composed of many overlapping scales, but the young leaves may not be distinguished readily. In the following spring, however, when the leaf bud grows, it is to be observed that the basal scales early fall away, as in the flower bud, and leave that portion of the developing stem entirely

bare. It thus happens that the leaves are arranged as previously stated in interrupted groups.

How many years constitute the life limit of the average rhododendron? I put this question to myself many times as I walked among these shrubs, and found for reasons which will presently appear, that in the end I was unable to answer it satisfactorily. It should be observed that this is very different from asking the age of a branch, a thing which can very readily be estimated. For determining the latter I have selected a representative branch of an average shrub in which I was able to distinguish twenty-eight yearly increments to its length, and thirty-one annual rings of growth. From its position in relation to the other branches I thought it to be at least one of the first to develop, if it was not the primary stem, a fact I was unable to determine. Thus, that branch was at least thirty years old, whatever may have been the age of the portion from which it sprang.

One is struck by the rarity of dead rhododendrons. I have seen very few, and upon investigating the probable cause of death of these, I always found it due to some catastrophe as the washing away of the soil. Whether the rhododendron as a plant rarely dies, the twigs and branches do, and the avoidance of death by the entire plant is brought about, as will presently be seen, by the development of adventitious buds.

The duration of the life of a branch naturally depends on that of the branchlets into which it is ultimately subdivided, and the life limit of these in turn, hangs partly at least on a proper balance between the production of flowers and of leaves, and possibly also to some degree on the length of the branch itself.

In order to carry on the life of the branch any twig must produce each season at least one leaf bud, whether it gives rise to flowers or not. Thus when flowers are also formed, the branchlet has a double burden. Now it happens when the branches are relatively long, that the vegetative (axillary buds) may not develop, the flower bud only doing so, and therefore the death of the twig follows with the ripening of the fruit.

Whether both flower and leaf buds develop the same season on the same twig depends apparently on the presence of suitable and

sufficient food as one or two facts seem to indicate. In the first place, branches evidently past their prime and relatively long, bear as a rule undersized leaves, and, as given previously, on such branches, a greater per cent. of flower buds than of leaf buds, or, than of flower and leaf buds, are found to undergo development. But, secondly, if for any cause the flower bud is killed, as by late spring frosts, it invariably happens that one and generally more of the axillary buds grow into as many branchlets.

Finally it is conceivable that the death of a sufficient number of twigs, by over-production of flowers, might in the end cause

FIG. 4. Fruits of *Rhododendron Catawbiense* of the present and the past year are shown; also flower and leaf buds; and leaves of the past and the present year. The leaves are partially removed to expose the flower buds.

the death of the entire plant. This however does not occur, as will presently appear.

When the rhododendron plant has reached a certain size, or more accurately a certain stage in its life history, it begins to put out branches, or suckers from the level of the ground or near it. Precisely what the stage in the development of the shrub is, when this takes place, is not easy to determine. It is probably associated with the over-production of flowers, and the consequent suppression of the development of leaf buds and is likely therefore concerned with questions of nutrition.

The course of the development of the suckers, or secondary

branches may be outlined as follows: A few small branches may be seen to rise from the bases of the larger ones in almost any mature shrub. When the older branches may be said to reach a state of senescence, by reason of overflowering, the suckers are noticeably abundant and relatively large, and finally, by the time the twigs of the parent branch are dead, they have assumed its form, have taken on its functions and have gradually replaced it. Through the vegetative rejuvenescence the rhododendron as a plant normally does not die, and it therefore may be considered, as Muir looks upon the big tree, as practically immortal.

A KEY TO THE NORTH AMERICAN SPECIES OF CORTINARIUS. — I

By F. S. Earle

The genus *Cortinarius* is one of the largest and most interesting among the mushrooms, many of the species being of considerable size and very attractive in coloring. As a rule they are found during late summer and fall, many of them occurring after the weather has become quite cool. Many of the species are edible and so far as known none of them are dangerously poisonous.

The sections and subgenera in *Cortinarius* are for the most part quite well marked and the study of the genus is made difficult by the great number of species and our limited knowledge of them rather than by any lack of good specific characters. In this genus the study of the earlier stages as well as of the fully developed plant is unusually important. The color of the young lamellae in particular should always be noted.

It should be borne in mind, as was stated at the beginning of this series of papers, that these keys are based on the existing literature only, and not on a study of the plants themselves. They are intended solely as an aid to the beginning of the serious study of these interesting plants and not to express final convictions in regard to their relationships.

Key to the Subgenera of Cortinarius

1.	Universal veil * present when young.	2.
	Without an evident universal veil.	3.
2.	Universal veil glutinous; the stipe consequently viscid.	*Myxacium.*
	Universal veil fibrous; stipe lanate or scaly, peronate.	*Telamonia.*
3.	Stout; pileus thick and fleshy.	4.
	Smaller and more slender; pileus thin at least at the margin.	5.
4.	Pileus viscid.	*Phlegmacium.*
	Pileus dry, often squamulose.	*Inoloma.*
5.	Pileus dry, at first villous or hirsute, sometimes becoming glabrate with age.	*Dermocybe.*
	Pileus moist, hygrophanous, glabrous, or with marginal whitish fibrils.	*Hydrocybe.*

Phlegmacium

1.	Stipe stout, fleshy.	2.
	Stipe slender, subcartilaginous; cortina medial.	Section *Elastici.*
2.	Stipe short, bulbous; cortina basal attached to margin of bulb.	Section *Scauri.*
	Stipe longer, cylindrical or bulbous; cortina superior.	Section *Cliduchi.*

Cliduchi

1.	Lamellae at first whitish or pallid.	2.
	Lamellae at first violet or purple.	5.
	Lamellae at first olivaceous.	7.
2.	Pileus pallid or alutaceous.	*C. sebaceus* Fr.
	Pileus brown with radiating gray center; stipe brown.	*C. radians* Earle.
	Pileus reddish-brown.	3.
	Pileus yellow or ochraceous.	4.
3.	Stipe spotted.	*C. maculipes* Pk.
	Stipe smooth, whitish.	*C. nudipes* Earle.
4.	Stipe attenuate below, at first scaly.	*C. clavicolor* Fr.
	Stipe equal, at first lanate.	*C. turmalis* Fr.
5.	Pileus dark-brown, fuliginous or fulvous.	*C. varius* (Schaeff.) Fr.
	Pileus light-brown or gray.	6.
6.	Stipe long, 10–15 cm.	*C. sphagnophilus* Pk.
	Stipe short, 2–5 cm.	*C. lanatipes* Pk.
7.	Pileus viscid, the margin at length revolute.	*C. infractus* (Pers.) Fr.
	Pileus glutinous, the margin strongly involute.	*C. glutinosus* Pk.

* It is unfortunate that the term "veil" is used in mycology for two entirely different things. As here used it refers to a more or less well developed external covering of the entire young plant. It is the structure which when fully developed as in *Amanita* becomes a volva. The inner veil or preferably the cortina is a fibrous or membranous covering of the young lamellae. When fully developed it remains as a permanent annulus on the stipe. In this genus the cortina is usually cobweb-like and is soon evanescent.

Scauri

1.	Lamellae at first white or pallid.	2.
	Lamellae at first blue, purple or violet.	5.
	Lamellae at first yellow or brownish.	7.
	Lamellae at first olivaceous.	9.
2.	Pileus dark bluish-violet, brown punctate.	*C. caesius* Clem.
	Pileus light red.	*C. sublateritius* Pk.
	Pileus yellow.	3.
	Pileus reddish-brown or orange brown.	*C. coloratus* Pk.
	Pileus white or whitish.	4.
3.	Pileus reticulate-rugose.	*C. corrugatus* Pk.
	Pileus smooth.	*C. intrusus* Pk.
4.	Lamellae crowded.	*C. albidus* Pk.
	Lamellae not crowded.	*C. communis* Pk.
5.	Pileus blue when young, fading to argillaceous.	*C. caerulescens* Fr.
	Pileus pale ochraceous.	*C. Copakensis* Pk.
	Pileus dark reddish-brown to olivaceous.	6.
6.	Flesh blue.	*C. purpurascens* Fr.
	Flesh yellow.	*C. glaucopus* (Schaeff.) Fr.
	Flesh white.	*C. calochrous* (Pers.) Fr.
7.	Stipe ochraceous; pileus with red fibrils.	*C. virgatus* Pk.
	Stipe white.	8.
8.	Stipe silky, striate.	*C. luteo-fuscus* Pk.
	Stipe smooth, shining.	*C. turbinatus* (Bull.) Fr.
9.	Pileus spotted; stipe striate.	*C. scaurus* Fr.
	Pileus not spotted; stipe silky.	*C. olivaceus* Pk.

Elastici

1.	Lamellae at first white.	*C. amarus* Pk.
	Lamellae at first violet-purple.	*C. porphyropus* Fr.
	Lamellae at first brownish.	2.
2.	Pileus reddish-yellow.	*C. ophropus* Pk.
	Pileus ochraceous.	*C. longipes* Pk.
	Pileus cinereous.	*C. lapidophilus* Pk.

MYXACIUM

Stipes floccose, the flocci at first covered with glutin.	Section *Colliniti.*
Stipes viscid, not floccose.	Section *Delibuti.*

Colliniti

1.	Lamellae at first white, pallid or argillaceous.	2.
	Lamellae at first yellow or brownish.	*C. muscigenus* Pk.
2.	Pileus orange brown.	3.
	Pileus fuscous or ochraceous.	4.
3.	Lamellae at first bluish-argillaceous; stipe floccose.	*C. collinitus* (Pers.) Fr.
	Lamellae at first white; stipe silky.	*C. mucosus* Fr.
4.	Stipe subconcolorous, floccose.	*C. sphaerisporus* Pk.
	Stipe white or lilac tinted, silky tomentose.	*C. elatior pallidifolius* Pk.

Delibuti

1. Lamellae at first white or pallid.	*C. splendidus* Pk.
Lamellae at first some tint of blue or violet.	2.
3. Pileus violet-purple.	*C. iodes* B. & C.
Pileus yellow.	*C. Berlesianus* Sacc. & Cub.

TWO NEW SPECIES OF SELAGINELLA IN THE SOUTHERN FLORA

By Lucien M. Underwood

Although the number of species in the *Selaginella rupestris* group has increased from three to sixteen within the limits of the United States through the work of the writer and that of Dr. Georg Hieronymus, of Berlin, the mine does not appear to be exhausted yet. The two following species are representatives of the flora of North Carolina, the first from the sandy barrens of the coastal plain and the second from the highlands at the opposite side of the state.

Selaginella acanthonota sp. nov.

Stem and branches stout, ascending, sending out abundant rootlets from the upper portions, softly hairy at the tips. Leaves in 8–10 regular series, 2 mm. long, gradually tapering into a roughened soft white awn one half to one third their length, with about 12 short irregular cilia on either side of the dorsal groove; strobiles fully 10 mm. long, quadrangular, the sporophylls broadly triangular and ciliate like the stem leaves.

Growing in sand along the coast and near it, North Carolina. A small fragmental specimen of this species was collected many years ago by Mr. Curtis and is in the Torrey herbarium; more abundant material was collected during the summer of 1899 in pine barrens near Wilmington, by Professor C. L. Williamson and has been grown in the conservatories of the New York Botanical Garden. The plant is a close ally of *S. rupestris* but differs notably in the regularly many-ranked leaves, in the dorsal cilia, from which the species receives its name, and in other characters.

Selaginella Sherwoodii sp. nov.

Plants forming densely branched compact tree-like tufts 6–8 cm. high. Stems repeatedly branching, erect or ascending, root-

ing only at the base, rigid, about 1.5 mm. in diameter; leaves about 10-ranked, short, about 1.5 mm. long, closely appressed, grooved dorsally in the lower two thirds, ending in a slender white coiled hair 0.7–0.9 mm. long, and with 8–12 very short minute cilia on each margin; strobiles inconspicuous, less than 5 mm. long, terminal on the branches, the sporophylls similar to the ordinary leaves but wider and graduating into them; microsporangia three-lobed, the microspores pale yellow, rugose-reticulate, 0.44 mm. in diameter; microsporangia round-reniform, the microspores bright yellow, smooth, 44 μ in diameter.

Near Highlands, Macon County, North Carolina, altitude 5,000 ft. J. Donnell Smith, 1882; W. L. Sherwood, 1901 and 1902 (type in the New York Botanical Garden).

Specimens of this plant first collected by John Donnell Smith are fairly well represented in D. C. Eaton's collection and more meager specimens are in the Gray herbarium; they have hitherto been confused with *S. tortipila* A. Br. Fine plants of this beautiful species have been collected in 1901 and again in 1902 by Mr. W. L. Sherwood, and these have enabled us to draw up the above description. The plant is allied to *S. tortipila* which it resembles in the coiled or twisted terminal hairs of the leaves. *S. tortipila* was described by Alexander Braun from plants collected in 1841 by Rugel and a cotype of the species is in our herbarium. In place of the slender lax sprawling habit of *S. tortipila* with enlarged though short strobiles, we have here a very compact bushy or tree-like plant with stout stems, many-ranked leaves, and strobiles which are scarcely noticeable as the branches graduate imperceptibly into them without enlargement. There is also a fragmentary specimen of this species in the Gray herbarium collected in South Carolina also by John Donnell Smith so that the species is likely to be found at various places in the higher attitudes of the Southern Appalachians.

VACATION OBSERVATIONS. I

By Francis E. Lloyd

Displacement of Leaves. — Occasionally a maple twig is found in which the leaves are arranged in decussating whorls of threes. If we accept the explanation that decussating pairs of leaves arise

by the shortening of alternate internodes, we must see in the stem of the *Catalpa* which normally has decussating whorls of three leaves, and in the maple twigs referred to, pairs of successive reduced internodes alternating with single normal internodes. Evidence that this is the case is seen in an abnormal twig of *Acer Pennsylvanicum*, found by the writer, in which the leaves of one pair were displaced, and so removed from each other, by a distance of $\frac{1}{16}$ inch and those of the next pair by $1\frac{1}{4}$ inches. The specimen is of further interest in the fact that the leaves of the former pair were alsodis placed, but here laterally, so that they lay in two separate axial planes, instead, as in the normal condition, in one. Such a displacement must occur in twigs which normally bear paired leaves when a third appears in the whorl. In the twig here described, however, the displacement was in the wrong direction, when referred to the upper displaced leaf of the next lower pair, so that three leaves were, in this way, crowded upon one side of the twig. Had the other leaf, *i. e.*, the lower of the under pair, been the upper, the relation would have then been, as one would have expected, regular.

The use of Wings in the Fruit of Acer. — The generally accepted view concerning the use of the wings in the fruit of *Acer* is that they serve as organs of flight to aid in dissemination. It is not impossible that they serve some other function, and I have endeavored to determine whether, during the development of the embryo, they may be of use in manufacturing foods for its nutrition. A certain amount of anatomical evidence is present to indicate that this is the case. Thus the venation appears to be so disposed as to serve for the translocation of solutions toward the embryo; and the minute structure, both as regards the stomata and the mesophyll, is very like that of a non-dorsiventral leaf, such as that of *Lactuca scariola*, or the phyllodia of various plants. There is but little development of spongy parenchyma; otherwise the organ is quite leaf-like.

By applying the iodine test it was shown that the wings are very active in the making of starch during the day, and, as in leaves, the materials accumulated during daylight suffered translocation. On the supposition that this movement of the starch

was directed toward the embryo, and ultimately reached it, the wings were removed from several dozen fruits with embryos in early stages of development. It was expected that the embryos of these fruits would show some signs of malnutrition, but as a matter of fact none did so, showing without doubt that the hypothesis toward the testing of which the experiments were directed was false. It would appear that, if the substances which are formed in the wing are of any use to the embryo, their amount forms no important part of the food supply. It may be possible that there was some compensation of some sort, but that is not very likely. So that for the present we may adhere to the view that these organs serve a useful turn after the close of their development; and their origin, if this is true, may be explained, so far as our present knowledge takes us, only by the workings of natural selection. The whole subject of the exact function of wings in fruits is open to investigation, for it is clear that the wings which occur in dehiscent fruits cannot be interpreted in the same fashion as those in indehiscent fruits.

SHORTER NOTES

NOTE ON THE "REPORT OF THE BROWN-HARVARD EXPEDITION TO NACHVAK, LABRADOR."*—Dr. E. B. Delabarre, of Brown University, in listing the Hepaticae collected on this expedition to Labrador, states that "all seven of the hepatics here named are now reported for the first time, although three of these names can be given as yet only provisionally," and in a later note remarks, "none of these are reported by the previously-named authorities, nor by W. H. Pearson in his *List of Canadian Hepaticae* (1890)." The "previously-named authorities" do not appear to include any American students of the Hepaticae and Dr. Delabarre has evidently overlooked the most complete list of Labrador Hepaticae yet published, a list of thirty-one species collected by the late Rev. A. C. Waghorne and Mr. O. D. Allen and published by Professor Underwood in the *Bulletin of the Torrey Botanical Club* in 1892 (**19**: 269). Four out of the seven of Dr. Delabarre's list are reported by Professor Underwood.

MARSHALL A. HOWE.

* Bull. Geog. Soc. Phila. 3: 167–201. 1902.

THE HABITAT OF THE SLENDER CLIFF-BRAKE. — In the last two numbers of *The Fern Bulletin*, reports have been published of the occurrence of the slender cliff-brake [*Cryptogramma Stelleri* (S. G. Gmel.) Prantl, *Pellaea gracilis* (Michx.) Beddome] on sandstone rocks, and the editor comments that it seems not to have been collected previously from other than limestone rocks. I think that it will be found that this fern grows not infrequently on other than limestone formations here in the East. The most luxuriant and abundant growth that I have ever seen was in Au Sable Chasm, New York, where it is found on a strongly siliceous sandstone with no limestone in the vicinity. There are at least two stations for this fern in the region of Mount Mansfield, Vermont, where the rocks are almost entirely gneissoid in character. In 1896 I found it in Nebraska Notch, and last year Mr. W. R. Davis, of Boston, collected it on Sterling Mountain. At St. Johnsbury it grows on a mica-schist formation far removed from limestone; the rock is considerably eroded, and more soil surrounds the plants than at any other station known to me. In August I collected this fern also on mica schist in Quechee Gulf, a remarkable gorge in the town of Hartford, Vermont, which is perhaps most noteworthy from a botanical standpoint for producing *Woodsia glabella* and *W. alpina* at the elevation of no more than four hundred feet above sea level.

ST. JOHNSBURY, VT. TRACY E. HAZEN.

NEWS ITEMS

The International Conference on Plant Breeding and Hybridization held at New York from September 30 to October 2, brought to the city a large number of botanists and horticulturists. Among the distinguished foreigners present were Mr. W. Bateson from Cambridge, England; Daniel Morris, Imperial Commissioner of Agriculture for the British Colonies at Barbadoes; Hon. William Fawcett, Director of the government plantations in Jamaica; and Mr. George Nicholson, curator of Kew Gardens, England. Papers were presented by Professor L. H. Bailey, O. F. Cook, W. M. Hays, S. A. Beach, T. V. Munson, William Saunders, and others; the program was especially interesting and provoked much discussion of the mutation theory.

OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

(1) BULLETIN

A monthly journal devoted to general botany. Vol. 28, published in 1901, contained 706 pages of text and 49 full page plates. Price $3.00 per annum. For Europe 14 shillings. Dulau & Co., 37 Soho Square, London, are agents for England.

Of former volumes, only 1–6 and 19–28 can be supplied entire from the stock in hand, but the completion of sets will be undertaken. Yearly volumes 1–5 (1870–1874), one dollar each. Vol. 6 (1875–1879), extending over five years, is furnished at the subscription price of five dollars. Vols. 19–27 (1882–1900) are furnished at the published price of two dollars each; Vol. 28, three dollars.

Single copies (30 cts.) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The MEMOIRS are published at irregular intervals. Volumes 1–7 and 9 are now completed and Nos. 1 and 2 of Vol. 8 and No. 1 of Vol. 11 have been issued. The subscription price is fixed at $3.00 per volume in advance. The numbers can also be purchased singly. A list of titles of the individual papers and of prices will be furnished on application.

(3) **The Preliminary Catalogue of Anthophyta and Pteridophyta** reported as growing within one hundred miles of New York, 1888. Price, $1.00.

Correspondence relating to the above publications should be addressed to

THE TORREY BOTANICAL CLUB
Columbia University
NEW YORK CITY

Vol. 2 December, 1902 No. 12

TORREYA

MONTHLY JOURNAL OF BOTANICAL NOTES AND NEWS

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

MARSHALL AVERY HOWE

JOHN TORREY, 1796–1873

CONTENTS

Vacation Observations—II: FRANCIS E. LLOYD 177
A Key to the North American Species of Cortinarius—II: F. S. EARLE 180
Petiolate Connation in Trifolium pratense: CHARLES A. WHITE 183
Reviews:
A new Index to Botanical Literature: LUCIEN M. UNDERWOOD 184
Proceedings of the Club: EDWARD S. BURGESS 186
News Items 190
Index to Volume II 193

PUBLISHED FOR THE CLUB
AT NORTH QUEEN STREET, LANCASTER, PA.
BY THE NEW ERA PRINTING COMPANY

THE TORREY BOTANICAL CLUB

OFFICERS FOR 1902

President,

HON. ADDISON BROWN, LL.D.

Vice-Presidents,

T. F. ALLEN, M.D. HENRY H. RUSBY, M.D.

Recording Secretary,

EDWARD S. BURGESS, PH.D.
Normal College, New York City.

Corresponding Secretary,

JOHN K. SMALL, PH.D.
Botanical Garden, Bronx Park, New York City.

Editor,

L. M. UNDERWOOD, Ph.D.,
Columbia University.

Treasurer,

FRANCIS E. LLOYD, A.M.
Columbia University.

Associate Editors,

NATHANIEL L. BRITTON, Ph.D. FRANCIS E. LLOYD, A.M.
CARLTON C. CURTIS, Ph.D. DANIEL T. MACDOUGAL, Ph.D.
MARSHALL A. HOWE, Ph.D. HERBERT M. RICHARDS, S.D.
ANNA MURRAY VAIL.

TORREYA is furnished to subscribers in the United States and Canada for one dollar per annum; single copies, fifteen cents. To subscribers elsewhere, five shillings, or the equivalent thereof. Postal or express money orders and drafts or personal checks on New York City banks are accepted in payment, but the rules of the New York Clearing House compel the request that ten cents be added to the amount of any other local checks that may be sent. Subscriptions are received only for full volumes, beginning with the January issue. Reprints will be furnished at cost prices. Subscriptions and remittances should be sent to Treasurer, Torrey Botanical Club, 41 North Queen St., Lancaster, Pa., or Columbia University, New York City.

Matter for publication should be addressed to

MARSHALL A. HOWE
New York Botanical Garden
Bronx Park, New York City

Vol. 2 No. 12

TORREYA

December, 1902

VACATION OBSERVATIONS—II

By Francis E Lloyd

Propulsion of Gemmae in Lycopodium lucidulum.—Leavitt * reports that the gemmae of *L. lucidulum* may be thrown to a distance of 3 to 4 feet. He induced the propulsion by pressing down gently at the extreme edge of the cotyledon-like leaf of the gemma. It is further suggested that in nature the gemmae must be struck by some object such as a moving plant or animal, or a rain drop, in order that the tension set up by the tissues of the clasping organ may be utilized for the expulsion of the gemma.

Having found a patch of gemmiparous plants at Northfield, Mass., early in September, I was led to repeat the experiments of Leavitt, at first by the method which he used, as above described, a method which I had used earlier in the case of *L. Selago* in the Austrian Tyrol.† It soon occurred to me, however, that there was a better way of doing it, possibly imitating the condition in nature more closely, namely by pinching the gemmiparous branch at its base in such a manner as to exert a slight pressure upon the leaves which clasp the gemma. It became possible in this way to set free the gemma without interfering in any way with its flight. By holding the plant near the ground on a level spot, so as not to give it any advantage of elevation, I found that the maximum flight reached somewhat over three feet, though in the majority of cases the range fell within fifteen inches. The trajectory, moreover, is markedly curved, falling in

* Leavitt, R. G. Notes on *Lycopodium.* Rhodora, 4: 57–60. Mr. 1902.

†Lloyd, F. E. Observations on *Lycopodium.* Torreya, 2 : 20, 21. F. 190 .

[The exact date of publication of each issue of Torreya is given in the succeeding number. Vol. 2, No. 11, comprising pages 161–176, was issued Nov. 25, 1902.]

the most striking instances from four to six inches in three feet. According to Leavitt, the longest horizontal distance of flight measured by him was 25 inches, though he adds: "The range of the trajectory *may* be three or four feet, *at the greatest.*" (Italics mine.)

Now, assuming that the normal range of flight for these gemmae is three feet, and that they fall only four inches in that distance, which gives us very favorable data for an estimate, the gemmae shot out from the 'up side' of a plant growing on a slope with one foot rise in three, would reach a distance of only about sixteen inches, measured on the slope, even if we assume a horizontal flight. If the plant be tilted so that its axis is at right angles to the slope, the force which would carry the gemma to a distance of three feet, with a vertical rise of one foot, would carry the object approximately six feet, horizontal distance, a conclusion quite at variance with the observed facts.

It would seem strange, too, that the gemmae which Leavitt saw were to be found only in *one* direction from the nearest adult plants as it is well enough known that they grow out in various positions on the stems.* An examination of these plants would have shown the basal parts of the gemmiparous branches, and Leavitt's conclusion may thus have been tested. To be sure, there is also the possibility that the conditions in other directions were not favorable for germination; but in the absence of definite evidence to the contrary we must assume that they were. There is, therefore, a considerable degree of probability that the plantlets referred to had some other origin.

Finally, the supposition that in order to initiate the propulsion of the gemma it must be struck by some moving object, may be beyond the facts. We may as justifiably assume that the mechanism is complete in itself, and that the tensions set up in the clasping leaves are sufficient to cause the phenomenon. Our observations touching this point are incomplete, and it is therefore better to hold the judgment in abeyance.

Movements of Leaflets in Onoclea sensibilis.—The statement

* Goebel has pointed out in the Organography (p. 651) that the gemmae do not grow on the side of the stem turned toward the sister stem of a fork but this, of course, does not affect our statement.

made by Amos Eaton in his botany published in 1824, that the leaflets of *Onoclea* "slowly approach each other on squeezing the stem with the hand," * prompted me to determine, if possible, what basis of fact there might lie beneath it.

Accordingly an attempt was made, in rather crude fashion, to be sure, to determine whether there was any movement rapid enough for ready observation. I was encouraged to do this by the experience which I had in noticing that the lowermost leaflets did approach each other sensibly within a period of ten minutes after plucking.

A series of experiments was carried out by cutting off the petioles of the leaves desired close to the ground, and pouring on water to prevent the entrance of air into the tissues in the event of negative pressure. Some were then measured by taking the distance between the tips of the bottom pair of leaflets, and between the tip of one of these and the apex of the leaf. The latter measurement proved of no value, since the twisting of the whole leaf vitiated the results. After measurement a few were allowed to stand in water, and others allowed to dry, and in the latter the movement of the leaflets was usually to be noted in five minutes although in some cases negative results only were obtained. Those remaining in water, on the other hand, usually remained fresh and showed no movement. The measurements of a few cases of leaves allowed to remain out of the water are given.

Time	9.55	10	10.02	10.15	10.55
Distance between tips of leaflets in inches.	2 5/8 3 3/4	2 1/8 3 1/2	2 3 1/2	1 5/8 3 3/8	7/8 2 1/2

Time.	10.40	10.45	10.50	11.30
Distance between tips of leaflets in inches.	2 3/4 3 1/8 3 1/2	2 5/8 2 7/8 3 1/4	2 1/2 2 3/4 3 1/8	1 1/2 1 3/4 —

* My attention was drawn to this statement of Eaton's by a paragraph, written by Miss B. L. Putnam in the Fern Bulletin, 7 : 15. Ja. 1899.

It appears from the experience of the writer, that the lower leaflets show a good deal of movement and that such movement is due to the rapid wilting of the leaf. There is a curious feature of the phenomenon, however, in the fact that the lessening of the distance between the leaflet tips is not due to a general curvature in those parts, at least in the early part of the process, but rather to a more local, and therefore stronger, curvature at the base of each leaflet.

The matter would seem not unworthy of further examination. We still are unable to answer the curious in regard to the origin of the specific name; nevertheless, that the leaf is "sensitive" appears doubtless true. "Squeezing the stem" has, however, nothing to do with it.

Spore Expulsion in Webera (*Diphyscium*) *sessilis.* — The peculiar, dorsiventral form assumed by the sporogonium of this plant is, according to Goebel, assumed under the influence of one-sided illumination. This was shown by cultivating the young sporogonia, which are radially symmetrical under appropriate conditions. The same author explains the form of this organ teleologically as an arrangement by which the dissemination is facilitated by falling raindrops.*

By tapping the upper side of a dry ripe capsule with a pencil point the action of the raindrop falling upon it may be imitated. In this way I have been able to see a puff of spores shot out very rapidly to a distance of two inches. Doubtless the natural conditions result still more favorably. The behavior is sufficiently striking, however, as it stands.

A KEY TO THE NORTH AMERICAN SPECIES OF CORTINARIUS.—II†

By F. S. Earle

Inoloma

1. Lamellae at first white or pallid. 2.
   Lamellae at first violaceous (as also the stipe and cortina). 4.
   Lamellae at first yellow, red, or cinnamon. 11.

* Organography (translation), p. 237.

† Continued from page 172.

2. Stipe colored like the pileus, hollow. *C. modestus* Pk.
   Stipe white. 3.
3. Pileus subferruginous; lamellae crowded. *C. caespitosus* Pk.
   Pileus whitish, then reddish-yellow; lamellae subdistant. *C. canescens* Pk.
4. Pileus light bluish or lilac. 5.
   Pileus dark bluish, violet or purple. *C. violaceus* (L.) Fr.
   Pileus no shade of blue or violet. 6.
5. Stipe strongly bulbous. *C. lilacinus* Pk.
   Stipe subconic or clavate, not bulbous. *C. albo-violaceus* (Pers.).
6. Stipe light-colored or whitish, at least below. 7.
   Stipe darker, sub-concolorous. 9.
7. Pileus grayish or whitish tinged with red. 8.
   Pileus brownish-gray. *C. erraticus* Pk.
8. Pileus nearly white; lamellae bright deep violet. *C. pulchrifolius* Pk.
   Pileus darker; lamellae dingy violet. *C. rubro-cinereus* Pk.
9. Pileus scaly. 10.
   Pileus silky-fibrillose, reddish-brown. *C. Clintonianus* Pk.
10. Pileus fawn-color with blackish scales. *C. pholideus* Fr.
    Pileus ochraceous with brown scales. *C. asper* Pk.
11. Pileus yellow or ochraceous. 12.
    Pileus cinnamon or ferruginous. 13.
    Pileus red or reddish-brown. 14.
12. Pileus smooth. *C. ochraceus* Pk.
    Pileus squamulose. *C. annulatus* Pk.
13. Pileus nearly smooth. *C. Catskillensis* Pk.
    Pileus densely fibrillose-squamulose. *C. squamulosus* Pk.
14. Pileus smooth, glabrous. *C. robustus* Pk.
    Pileus fibrillate. 15.
15. Flesh pallid; odor of radishes. *C. craticius* Fr.
    Flesh white; odor none. *C. autumnalis* Pk.

TELAMONIA

1. Lamellae thick, rather distant; stipe spongy or fibrous. Section *Platyphylli*.
   Lamellae thin, narrow, crowded; pileus thin; stipe hollow, subcartilaginous. Section *Leptophylli*.

Platyphylli

1. Stipe and veil white. 2.
   Stipe and lamellae violet, cortina light violet, veil white. 6.
   Stipe and veil red or yellow; lamellae cinnamon. 7.
   Stipe brown; lamellae dark, brownish. 9.
2. Pileus pale gray. *C. griseus* Pk.
   Pileus dark brown. 3.
3. Lamellae at first ferruginous. *C. gracilis* Pk.
   Lamellae at first yellow. 4.
4. Stipe solid. *C. flavifolius* Pk.
   Stipe stuffed or hollow. 5.

5. Pileus conic to convex, umbonate. *C. badius* Pk.
Pileus convex to expanded. *C. castaneoid·s* Pk.

6. Pileus violaceous to brick-red. *C. torvus* Fr.
Pileus violaceous to grayish-red. *C. torvus nobilis* Pk.

7. Lamellae linear ; pileus bay or brick red. *C. Robinsonii* Mont.
Lamellae broad. 8.

8. Stipe yellow. *C. paludosus* Pk.
Stipe reddish, or whitish with two to four red zones. *C. armellatus* (A. & S.) Fr.

9. Lamellae purplish-brown ; pileus dark brown to pallid. *C. adustus* Pk.
Lamellae brown or yellow-brown. 10.

10. Stipe long, 5–8 cm.; pileus bay-brown to fulvous. *C. distans* Pk.
Stipe shorter, 2½–5 cm.; pileus fuscous to ochraceous. *C. furfurellus* Pk.

Leptophylli

1. Stipe white or pallid. 2.
Stipe violescent. *C. subflexipes* Pk.
Stipe brown. 3.

2. Pileus blackish chestnut, paler when dry. *C. nigrellus* Pk.
Pileus watery cinnamon, paler when dry. *C. lignarius* Pk.

3. Pileus densely fibrillate. *C. hemitrichus* (Pers.) Fr.
Pileus canescent, then glabrate and rimose. *C. ili·podius* (Bull.) Fr.

DERMOCYBE

1. Lamellae at first white or pallid. 2.
Lamellae at first violet or purple. 5.
Lamellae at first yellow, red or cinnamon. 7.
Lamellae at first dark brown or olivaceous. 13.

2. Pileus white or pallid. 3.
Pileus dark brown. 4.

3. Lamellae crowded. *C. ochroleucus* (Schaeff.) Fr.
Lamellae subdistant. *C. albidifolius* Pk.

4. Pileus subglabrous. *C. sericeps* Pk.
Pileus with minute brown scales. *C. tigrinus* Johns.

5. Pileus grayish-violet when young. 6.
Pileus argillaceous. *C. brevissimus* Pk.
Pileus dark reddish-brown. *C. anomalus* Fr.

6. Lamellae subcrowded. *C. simulans* Pk.
Lamellae distant. *C. rimosus* Pk.

7. Lamellae and cortina red. 8.
Lamellae yellow or brown. 9.

8. Entire plant cinnabar red. *C. cinnaba·inus* Fr.
Entire plant blood red. *C. sanguineus* (Wulf.) Fr.

9. Pileus yellow. *C. luteus* Pk.
Pileus dark chestnut. *C. castanellus* Pk.
Pileus cinnamon or tawny brown. 10.

10. Cortina forming a webby basal annulus. *C. basalis* Pk.
Cortina not forming a basal annulus. 11.

11.	Spores large, 11–13 $\mu \times 4$–5 μ.	*C. aurrifolius* Pk.
	Spores smaller, 7–8 $\mu \times 4$–6 μ.	12.
12.	Stipe long, 5–8 cm.	*C. cinnamomeus* (L.) Fr.
	Stipe short, 1½–2½ cm.	*C. Sintenisii* Bres.
13.	Stipe white.	*C. appendiculatus* Johns.
	Stipe concolorous.	*C. lutescens* Pk.

HYDROCYBE

1. Pileus somewhat fleshy, margin incurved when young; stipe attenuate above. Section *Firmiores.*

   Pileus submembranous, margin straight from the first; stipe subcylindric or attenuate below. Section *Tenuiores.*

Firmiores

1.	Stipe white, cortina colored like pileus.	2.
	Stipe and lamellae violaceous.	3.
	Stipe and subobsolete veil yellow or reddish.	4.
	Stipe brown; cortina white or pallid; lamellae dark.	5.
2.	Lamellae at first pallid.	*C. armeniacus* (Schaeff.) Fr.
	Lamellae at first violaceous.	*C. regularis* Pk.
3.	Stipe smooth, glabrous.	*C. castaneus* (Bull.) Fr.
	Stipe fibrillose.	*C. fusco-violaceus* Pk.
4.	Small; pileus 1–2 cm.; in pastures.	*C. vernalis* Pk.
	Larger; pileus 2½–4 cm.; in woods.	*C. pulcher* Pk.
5.	Small; pileus 1–3½ cm.; on ground in woods.	*C. praepallens* Pk.
	Large; pileus 10 cm.; on logs.	*C. rubidus* Mont.

Tenuiores

1.	Pileus bay-brown, disc darker.	*C. decipiens* (Pers.) Fr.
	Pileus pale alutaceous, darker when dry.	*C. pallidus* Pk.
	Not able to place	*C. venosus* Johns.

NEW YORK BOTANICAL GARDEN.

PETIOLATE CONNATION IN TRIFOLIUM PRATENSE

BY CHARLES A. WHITE

Among the autumn stools of *Trifolium pratense* growing upon my house-lot in Washington I discovered in October last a leaf consisting of five leaflets and an unusually strong petiole. It was the fifth and innermost one of the five leaves which were then borne upon one of the six sprouts constituting the stool. All the other leaves of that stool, and all those of the many other stools which I examined bore only the normal number of three leaflets each. Supposing this leaf to have been a foliate variation similar to that which has become the race character of Professor

de Vries's *T. pratense quinquefolium*, I potted the whole stool upon which it grew for further observation. The following remarks, however, refer only to the leaves of that sprout which bore the leaf with five leaflets just mentioned. A few days after the plant was potted a new leaf, number 6, appeared from between the infolded stipules of number 5 and upon the same side of the axis of the sprout. This leaf consisted of six leaflets and, like number 5, it had a strong petiole with a shallow median groove along its upper side; and a cross section showed that the internal canal was double. Number 7 soon came out on the opposite side of the sprout and bore only three leaflets. Number 8 came out on the same as numbers 5 and 6, bearing six leaflets upon a petiole like that of each of those numbers. Only these three abnormal leaves appeared and they were preceded and followed by normal leaves on the sprout that bore them. The structure of the petiole of each plainly shows connation, and it necessarily follows that the leaflets in excess of three were not supernumeraries, but normal leaflets of one of the two petioles which are thus represented. The double character of these three petioles was easily traceable from the leaflets to the stipules but there it disappeared, and I found no trace of duplication of the stipules. The connation in number 6 extended to the two middle petiolules of the leaflet cluster and also to the lower part of the two leaflet blades which they bore; but in numbers 5 and 8 all the leaflets and petiolules were fully separate. I assume that one of the leaflets of number 5 was aborted. These three abnormal leaves are evidently monstrosities and not such cases of true multiplication of leaflets as occur in *T. pratense quinquefolium* and in ordinary four-leafed clover. The leaves here referred to, numbers 5, 6, 7, and 8, are preserved in the herbarium of the U. S. National Museum.

WASHINGTON, D. C.,
November, 1902.

REVIEWS

A new Index to Botanical Literature

Under the auspices of the Royal Society of London, an International Catalogue of Scientific Literature was begun with the opening of the twentieth century. The first issue of Section

M, Botany, for 1901 has just been received, though it is dated May 1902. It is a small octavo of 378 pages giving: (1) An author's catalogue in which the titles of something like 2,100 botanical papers issued during last year are listed, followed by (2) A subject catalogue in which the same titles appear under one or more topics arranged on a numerical system which is practically a reclassification of the Dewey system with the points omitted. Under each of the major divisions of the subject Taxonomy occur lists of new species published in the papers cited.

As the Society announces the further issuance of a second part during the year to complete the record of the world's botanical literature for 1901, they have for the present disarmed criticism along a very important line, namely completeness. As the annual output of botanical literature during the past decade has ranged from 5,000 to 8,000 titles, it will be necessary for the second part to be considerably larger than the present one. Taking a random half dozen well-known American contributors whose titles for 1901 have been published elsewhere, the present volume gives less than one half of their contributions to botany, and for some not over one third of them.

The enormous work entered upon by the Society can better be seen when we learn that botany is only one of the seventeen subjects whose literature is being listed in this series of publications.

The strongest criticism that can be made on the system aside from the question of completeness is that it is a book instead of a card catalogue. When, for example, the year 1925 is reached, not to look farther into the future, one will be obliged to consult twenty-five individual author catalogues to find a given article by any desired author unless its exact date is known in advance. One will be obliged to consult the same number of subject catalogues to find the summary of literature on any one subject, as, *e. g.*, the Hepaticae, for the period covered. Until the European library system attains the efficiency of the American in adopting the standard card catalogue, such a publication may involve practical difficulties, but it is the only

solution of the index problem. The literature relating to American botany has now been indexed since 1894 on the card system; by purchasing duplicate cards each library can adopt the subject catalogue suited to its own needs which are sure to vary according to the size, purpose, and character of the library. Under the card system, however long the index is continued, there will be simply one place to search for any paper by any author; the example of Just's Jahresbericht, hitherto our most valuable index for the world's literature, has demonstrated the practical inutility of the annual volume as an index guide. Life is too short to be forced to waste time consulting annual volumes when there is an infinitely simpler way. LUCIEN M. UNDERWOOD.

PROCEEDINGS OF THE CLUB

TUESDAY, OCTOBER 14, 1902

The meeting was held at the College of Pharmacy; 13 present; Dr. Britton in the chair.

The scientific program consisted of informal reports of summer work and observations.

The secretary spoke of his collections of asters, also of *Euphrasia* and other alpine plants in the White Mountains. Discussion regarding Wettstein's monograph of *Euphrasia* followed.

Professor Lloyd reported various observations made during the summer, which are being published in the current numbers of TORREYA.

Dr. Tracy E. Hazen reported observations about St. Johnsbury, Vt., on the black maple, *Acer nigrum*. He maintained its specific distinctness from the sugar maple. Dr. Britton confirmed its distinctness as seen in other parts of western New England and in western New York. Its leaves are darker beneath and are said to expand about two weeks later in spring, its fruit is much larger and there seems to be a difference in the angle of divergence of the keys.

Miss F. A. Mulford spoke of the flora of the Hempstead plains, on Long Island, remarking on certain similarities to that of Kansas.

Miss Mary E. S. Davidson reported observations when at Wood's Hole this summer, upon an interesting green fungus, new to that region, a *Lactarius*.

Miss Catharine Murray spoke of her visit to the botanical gardens at Kew, Brussels, Paris, etc.

Mr. Eugene Smith, Miss L. K. Lawall, and others, spoke of a number of localities for the fringed gentian near New York, and of an increased attendance upon the summer excursions.

Dr. MacDougal remarked upon the dissimilarity of the alpine conditions of the Rockies from those of the White Mountains. Tracts which in July in the rains of the White Mountains are covered merely with green would have been blazing with flowers if in the Rockies.

Dr. Underwood spoke of the recognition among farmers about Redding, Ct., of two types of the sweet flag, *Acorus Calamus* L., that with a white root being in favor, that with a red root being smaller and somewhat bitter, and with young leaves of a different tone of color.

Dr. Underwood also mentioned his finding young plants of the date-palm coming up in railway rubble at South Norwalk, Ct.; similarly observed on garbage-heaps about New York by Mr. Eugene Smith. He spoke also of the successful cultivation on a lawn at Danbury, Ct., of our native orchid *Cypripedium reginae* Walt., where in four years a cluster of three or four plants has increased to forty.

Dr. Underwood also referred to the Torrey Club's Fourth of July excursion, when the Botanical Club of Syracuse provided generous entertainment. The saline plants about Onondaga Lake are disappearing and the refuse from the soda-ash process is gradually filling up the lake. Where such plants as *Salicornia* once occurred by the acre, there are now but few plants remaining.

He referred also to his finding that *Botrychium neglectum* and *B. lanceolatum* still survive in the original locality where he first found these small species some twenty-five years ago.

Mrs. Britton reported upon observations on an interesting *Vittaria* brought by Dr. Evans from Porto Rico; and upon forms of *Stachys* found by her on Hempstead Plains in Long Island.

In a white cedar swamp there she observed the newly recognized fern *Dryopteris simulata* growing in great masses and abundantly distinct.

Mrs. Britton spoke also of certain instances of new habit assumed by mosses on adopting a new habitat as in a *Leptodon* usually on trees, latterly found in tufts on dry rocks; and in case of *Porotrichum Alleghaniense*, at Green Lake, Jamesville, New York, an aquatic form surviving the desiccation of the rock surfaces, and now assuming the habit of a *Climacium*.

Dr. Britton, whose summer was largely given to administrative work, secured time for attendance upon the Association meetings at Pittsburg, and for prosecution of his studies on the Cyperaceae and the Crassulaceae at Kew. Nearly half of the known species of North American Crassulaceae are now growing in Washington or at the New York Botanical Garden, a necessary preliminary to proper descriptive work with these plants. The fleshy foliage and calyx require description from the life, not, as often hitherto, from herbarium specimens. Many of the numerous Mexican Crassulaceae are very local, and known only from one or two localities.

Discussion followed upon the effects of the prolonged wet weather of the present season, Dr. Hazen remarking upon sedges in Vermont which are usually stiff but this year were very long and decumbent.

EDWARD S. BURGESS,
Secretary.

WEDNESDAY, OCTOBER 29, 1902

The meeting was held at the Botanical Garden at 3:30 P. M.; 20 persons present; Dr. MacDougal in the chair.

Professor D. S. Johnson, of the Johns Hopkins University, was elected to active membership.

Two resignations were accepted: Mrs. Francis S. Parsons, Albany, and Miss Mary T. Pitman, Providence.

The scientific program followed: The first paper presented was by Miss F. A. Mulford, "Remarks on *Gerardia decemloba*, Greene, with exhibition of specimens." The plant was found at Hempstead, Long Island, September 5, 1902. This is the second station for the species; it was first found by Professor

Greene at Washington, D. C., in 1898. Dr. Britton followed with remarks upon the peculiar physiography of the Hempstead plain, its isolation, and the lack of trees, which is perhaps due to fires.

The second paper was by Miss Anna Murray Vail on "Some rare Books recently added to the Library of the New York Botanical Garden." This will shortly appear in the *Journal of the New York Botanical Garden.* Among some 400 works of the older botany recently procured, and now exhibited to the Club, the oldest is a fifteenth century MS. of Macer Floridus *De virtutibus herbarum*, in Gothic letters. The oldest printed volume is one of the Ortus Sanitatis, from the end of the fifteenth century; the next, the Venice edition of 1509 of the *Aggregator practicus*, one of the herbals often known simply as *Herbarius.* Later notable works secured, include many of those of Mattioli, Dodoens, and Lobel; the rare first volumes issued by Dodoens (his *De frugum Historia*, 1552) and by Clusius (1557); also a copy of Clusius' greatest work, his *Rariorum* of 1601, of special interest because a presentation copy from Clusius himself. Rarities include a Passaeus of 1614, and the elephant folio of the *Hortus Eystettensis* of 1613, in unusually fine preservation. There is a fine copy of Rivinus of 1690; and one of Linnaeus' rarest works, his autobiographical pamphlet of 1741, "*Orbis eruditi judicium*," believed to exist in only four copies.

The third paper was by Dr. Rydberg, a "Review of a recent Monograph of *Campanula rotundifolia* and its Allies." In the discussion of the paper Dr. MacDougal called attention to the work of Goebel on this plant, saying that Goebel had been able to produce rounded leaves on *Campanula*, by experiment, and in any part other than the inflorescence, but that it had not been possible to prevent the formation of the rounded basal leaves.

The final paper was given by Dr. Arthur Hollick on "Buried swamp Deposits of Maryland." Along the shores of the Chesapeake Bay swamp deposits of the Pleistocene era are being uncovered by water action. These occur under from five to thirty feet of gravels. Among the vegetable remains discovered, there were described and shown stumps of the bald cypress, cones of

two species of *Pinus* (*P. echinata* and *P. Strobus*), and beech and hickory nuts. Many seeds are now being determined by experts of the Department of Agriculture. When the determination of the seeds is completed a good account of the ancient flora of that region can be given. A comparison of the living with the fossil plants of the locality shows that, except for the cypress, the plants now growing seem the same as those there in Pleistocene time.

In discussing the conditions attendant on the formation of the ancient flora and its disappearance, Dr. Hollick stated that the land had undergone elevation twice and subsidence twice. The first elevation preceded the formation of the flora, which was to be found mainly in the valleys. The area was then depressed and completely submerged, and at length was covered by sand brought in by the waves. After the first elevation and during the first subsidence deposits were formed either *in situ*, as swamps, or at the mouths of the valleys by transported material. These after the second elevation are now being exposed by erosion. The second subsidence is now taking place, and a second series of vegetable deposits is being laid down. The rate of this subsidence has been calculated to be about two feet in the century.

EDWARD S. BURGESS,
Secretary.

NEWS ITEMS

Mr. Homer D. House, Syracuse University, 1902, has entered Columbia University as a graduate student in botany.

Professor A. D. Selby, botanist of the Ohio Agricultural Experiment Station, is carrying on some special lines of research at the New York Botanical Garden.

The editor of *Torreya* spent the greater part of the months of October and November in Florida, studying and collecting the marine algae of that region.

A suggestive nature study leaflet entitled "Plant-Travellers" has recently been issued by Professor Clarence Moores Weed, of the New Hampshire Agricultural Experiment Station.

The large collection of West Indian and South American ferns accumulated by the late George S. Jenman, of Georgetown, British Guiana, has been purchased by the New York Botanical Garden.

Dr. Frederic E. Clements and wife, of the University of Nebraska, have recently devoted a few weeks to consulting the herbarium and library of Columbia University and the New York Botanical Garden.

Mr. R. S. Williams is again at the New York Botanical Garden after a year and a half spent in Bolivia where he has made extensive collections of plants. His gatherings are particularly rich in bryophytes and ferns.

Dr. William Austin Cannon, of the New York Botanical Garden, has been awarded a grant of five hundred dollars by the Carnegie Institution for the completion of cytological researches relating especially to the oögenesis, spermatogenesis and fertilization of certain plant hybrids.

Professor F. S. Earle returned to New York on December 2 from a six weeks' visit to the island of Jamaica. He was especially occupied while there in gathering data for a study of the diseases of logwood, cocoanut, and other plants of economic importance.

Among the botanists visiting New York in the past few weeks have been Professor Treub, Director of the Botanical Garden at Buitenzorg, Java; Professor F. E. Weiss of the Owens College, Manchester, England; and Professors Lester F. Ward and F. H. Knowlton, of Washington, D. C.

The American Association for the Advancement of Science, the Botanical Society of America, the Society for Plant Morphology and Physiology, and the Botanists of the Central and Western States all hold meetings in Washington, D. C., during "Convocation Week," December 27, 1902, to January 3, 1903.

The *Revue Bryologique* announces the death of the distinguished bryologist, K. Gustav Limpricht, which occured at Breslau on the 20th of October in his 69th year. Limpricht was best known by his masterly treatment of the Musci of Germany, Austria, and Switzerland in Rabenhorst's Kryptogamen-Flora. His writings on the Hepaticae also are important and thorough-going.

"The Ulothricaceae and Chaetophoraceae of the United States," by Dr. Tracy Elliot Hazen, comprising Vol. 11, No. 2, of the Memoirs of the Torrey Botanical Club, was issued in

October; the "History of Pre-Clusian Botany in its Relation to Aster," by Dr. Edward Sandford Burgess, constituting Vol. 10 of the Memoirs, was published in November; and the "Flora of New Providence and Andros (Bahama Islands)" by Mrs. Alice R. Northrop, forming No. 1 of Vol. 12 of this series, was issued December 10.

Messrs. Charles Humphrey Bissell and Luman Andrews have recently published a "Flora of the Town of Southington and its Vicinity: A List of the Fern and Seed Plants growing without Cultivation." In an area of approximately thirty-six square miles 1,201 species are listed. An interesting comparison is made, by families, with the 1,563 species reported in the Flora of Vermont published in 1900.

The death of Dr. Timothy Field Allen occurred at his home in New York on December 5, after an illness of many months. He was born in Westminster, Vt., April 24, 1837. Dr. Allen was not only distinguished in his profession as a physician and surgeon, but was also for many years the leading American student of the Characeae. An account of his collections of Characeae, which he presented to the New York Botanical Garden about two years ago, was published in the *Journal* of the Garden for April, 1901. Dr. Allen was a charter member of the Torrey Botanical Club and had been for many years its senior Vice-President. It is expected that a more extended notice of his life and work will appear in an early number of the *Bulletin* of the Club.

ERRATA, VOLUME 2

Page 49, 11th line, *for* writter, *read* writer.
Page 69, 1st line, *for* Berolensis, *read* Berolinensis.
Page 72, 25th line, *for* humosa, *read* humerosa.
Page 96, 3d line, *for* Planting, *read* Plant.
Page 173, 7th line, *for* microsporangia, *read* macrosporangia.
Page 173, 8th line, *for* microspores, *read* macrospores.

INDEX TO VOLUME II

New names and the names of new genera and species are printed in **boldface type.**

Abies grandis, 129
Abrams, L. R., A new Hemizonia from California, 122
Acer circinnatum, 130, 132, 133; macrophyllum, 130; nigrum, 186; Pennsylvanicum, 174
Acorus Calamus, 187
Acrostichum Haddeni, 146
Adopogon Caroliniaum, 104
Agarum, 76
Alaria, 76
Alleghanies, Viola renifolia in the Pennsylvanian, 75
Allen, J. A., personal, 14
Allen, T. F., death of, 192
Alliaria Alliaria, 52
Alnus, 130, 132; Oregana, 130
Amaranthus crispus, 51
Amelanchier, 131; Botryapium, 52
American Society of Naturalists, 13
Ammophila, 59
Amorphophallus, 126
Anderson, A. P., 59; personal, 144
Andromeda phillyreaefolia, 158
Androsace pinetorum, 156
Anemia robusta, 145; **supercretacea,** 145
Andrews, L., see Bissell
Anemone globosa, 156
Antennaria aprica, 156; neglecta, 53
Anthoceros punctatus, 50
Anthurium, 12
Anthurus borealis, 49
Aquilegia Eastwoodiae, 75; micrantha Mancosana, 75; **Mancosana,** 75
Aquilegia, The name of a western, 75
Aragallus pinetorum **Veganus,** 155
Araliopsis, 35
Arctostaphylos Uva-ursi, 59
Arenaria verna, 47
Aristolochia Serpentaria, 103
Armillaria mellea, 25
Asclepias rubra, 104
Ascocorticium, 11
Asperula azurea, 106; galioides, 106; montana, 106, 108; setosa, 106; tinctoria, 106
Aspidium Kennerleyi, 146
Asplenium magnum, 146; viride, 47
Aster amellus, 60
Astragalus accumbens, 155; Jesupi, 47; mollissimus, 154; **simulans,** 154
Azalea lutea, 161

Bactris, 12
Bailey, L. H., personal, 176
Ballia, 149
Barnes, C. R., personal, 62
Bateson, W., personal, 176
Batrachium trichophyllum, 104
Beach, S. A., personal, 176
Bennett, A. W., death of, 48
Berberis, 130
Berry, W., Additional Notes on Liriodendron Leaves, 33; Notes on the Local Flora, 103
Bidens Beckii, 27
Bissell, C. H., and Andrews, L., work of, 192
Blakeslee, A. F., personal, 64
Blephariglottis grandiflora, 47
Bolandra, 125
Boletinus, 2
Boletus, 2
Bostrychia, 149; Calliptera, 149; Moritziana, 151
Botanical Garden, New York, 29, 31, 62, 64
Botanical Society of America, 63, 128
Botanisches Centralblatt, 16
Botanists of the Central States, 13
Botrychium neglectum, 187; lanceolatum, 187
Brachythecium acutum, 51; Noveboracense, 51; oxycladon, 51
Britten, J., personal, 13
Britton, E. G., Bryological Notes, 44; Notes on a Long Island Moss, 91
Britton, N. L., A new Mouriria from Porto Rico, 10; A new Peperomia from the Island of St. Kitts, 43; An undescribed species of Hydrophyllum, 123; personal, 79, 144, 160
Brodiaea, 61

Brooklyn Institute of Arts and Sciences, 62, 63
Brown, A., personal, 126
Bryhnia Novae-Angliae, 51
Bryological Notes, 44
Bryum proligerum, 44
Burgess, E. S., 28, 60, 192; Proceedings of the Club, 10, 45, 58, 76, 111, 186
Burnett, D. A., personal, 62
Burnham, S. H., 27; Proceedings of the Club, 92
Buxbaumia aphylla, 50

California, A new Hemizonia from, 122
Callipeltis Cucullaria, 106
Caloglossa Leprieurii in Mountain Streams, 149; Amboinensis, 151; Beccarii, 151; Leprieurii, 152; Zanzibariensis, 151
Camarophyllus, 73
Campanula, 189; rotundifolia, 189
Campbell, D. H., work of, 63
Campbell's University Text Book of Botany, 108
Campylium, 50
Cannon, W. A., 61; personal, 94, 191; Field Notes on Rhododendron Catawbiense, 161
Cantharis Nuttallii, 155
Capsella Heegeri, 67; Bursa-pastoris, 67
Cardamine flexuosa, 52; Pennsylvanica, 52
Carduus ochrocentrus, 42; albiflora, 42
Castalia odorata, 27; tuberosa, 27
Castanea dentata, 103
Castilleja acuminata, 47
Catalpa, 174
Catenella impudica, 149
Caulophyllum thalictroides, 104
Cereus giganteus, 62
Cercosporidium euphorbiae, 159; Helleri, 160
Cecropia, 12
Chamberlain, C. J., personal, 16, 127
Chara, Description of a new fossil Species of, 71; compressa, 72; Springerae, 72; Stantoni, 72
Chelidonium laciniatum, 67; majus, 67
Chenopodium Boscianum, 51
Chesnut, V. K., personal, 31
Chrysosplenium, 125
Cimicifuga racemosa, 104
Cissites acuminatus, 35, 36; obtusilobus, 35
Clarke, C. H., personal, 64
Clements, F. E., personal, 191
Cleome serrulata albiflora, 42
Clethra alnifolia, 104
Cliffbrake, The Habitat of the slender, 176
Climacium, 188; Kindbergii, 51
Clinopodium vulgare, 52
Cockerell, T. D. A., Notes on southwestern Plants, 42; Some New Mexico Plants, 154; The Name of a Western Aquilegia, 75
Colorado, Fossil Ferns from the Laramie Group of, 145
Comandra livida, 47
Commelina, 12
Conard, H. S., work of, 63
Conference on Plant Breeding, 176
Conopholis Americana, 104
Conservation of Energy in Mycological Clubs, 1
Cook, O. F., personal, 80
Copeland, E., personal, 63
Coprineae, Keys to the North American Species of the, 37
Coprinus, 2
Coptis trifolia, 104
Corema Conradii, 59
Cornus Nuttallii, 130
Cortinarius, A Key to the North American Species of, 169, 180
Corylus rostrata, 131
Coulter, S. M., personal, 63
Coville, F. V., personal, 79, 127
Cowles, H. C., personal, 63, 95
Crataegus, 32
Credneria, 35
Crepis virens, 52
Crescentia, 93
Crucianella gilanica, 106, 108; herbacea, 106; macrostachya, 106, 108
Cryptogramma Stelleri, 176
Curtis, C. C., MacDougal's Elementary Plant Physiology, 56
Cuscuta Gronovii, 105; indecora, 105
Cypripedium Calceolus, 86; flavescens, 87; hirsutum, 84, 85; parviflorum, 85–87, 103; passerinum, 86; reginae, 187

Daedalea quercina, 88; unicolor, 89
Davidson, A., personal, 31
Davis, B. M., personal, 95
Davy, J. B., work of, 160
Davis, N. F., personal, 63
Davis, W. T., Hypochaeris radicata, 45
Delabarre, E. B., work of, 175
Delesseria Leprieurii, 151
Dendrium buxifolium, 163; prostratum, 163
Diapensia, 47
Dichelostemma capitatum, 61
Dichondra, 62
Dicranum longifolium subalpinum, 47

Dieffenbachia, 12
Diodia teres, 106, 108; Virginiana, 106, 108
Dioscorea, 12
Diphyscium sessile, 180
Draba incana, 47; streptocarpa, 156
Dryopteris fragrans, 47; simulata, 32, 51, 188
Duggar, B. M., personal, 94
Dunn, L. B., personal, 63

Earle, F. S., Keys to the North American Species of the Coprineae, 37; A Key to the North American Species of Cortinarius, 169, 180; A Key to the North American Genera and Species of the Hygrophoreae, 53, 73; A Key to the North American Species of Hypholoma, 22; A Key to the North American Species of Lactarius, 139, 152; A Key to the North American Species of Russula, 101, 117; A much named Fungus, 159; The Field Study of Mushrooms, 2; personal, 45, 62, 94, 125, 126, 191
Echinopanax horridum, 133
Eggert, H., Notes on Verbena, 123
Elatine Americana, 52
Eleocharis elongata, 157
Ellis, J. B., personal, 95
Emerson, J. T., personal, 79
Erigeron hyssopifolius, 47
Eriophorum gracile, 103
Erodium, 52
Ephedra, 76
Erythronium albidum, 103
Eupatorium, 12
Euphorbia, 12, 159; maculata, 52
Euphrasia, 186
Euonymus Americanus, 104
Entada scandens, 5
Equisetum, 11
Equisetum hyemale, 51; sylvaticum, 51
Eurhynchium strigosum praecox, 51
Evans, A. W., personal, 126, 144
Excursion, Torrey Club, Fourth of July, 93
Expedition to Nachvak, Labrador, Note on the Report of the Brown-Harvard, 175

Fallugia micrantha, 42
Fawcett, W., personal, 176
Ferns, Fossil, from the Laramie Group of Colorado, 145
Ficus, 12
Field, G. W., personal, 112
Field Days, Torrey Club, 77
Field Study of Mushrooms, The, 2
Fissidens grandifrons, 44
Flora of Long Island, Additions to the recorded, 49
Florida, A seabeach Helianthus from, 74
Fragaria Americana, 159; vesca alba, 158
Fraxinus Oregana, 130
Frost, C. C., herbarium of, 94
Forsythia, 137
Favolus, 87
Fowler, J., personal, 144
Fucus, Extrusion of the Gametes in, 134; edentatus, 137; evanescens, 136; serratus, 76, 137; spiralis, 136; vesiculosus, 136
Fujii, K., personal, 31
Fungus, A much named, 159
Fungi, The Bracket, 87
Fusicladium fasciculatum, 159, 160

Galium aparine, 106; Mollugo, 106; pilosum, 106; Parisiense, 106; tinctorium, 106; triflorum, 106
Galloway, B. T., personal, 127
Gametes in Fucus, Extrusion of the, 134
Gaultheria, 130
Gaura biennis, 52
Gentiana acuta, 47
Georgia, A Visit to Okefinokee Swamp in southern, 156
Geranium Bicknellii, 32; dissectum, 52
Gerardia decemloba, 188
Gibbs, R. E., work of, 63
Gies, W. J., personal, 96
Gleditsia triacanthos, 5
Gleichenia, 26; delicatula, 147; rhombifolia, 147
Gloiosiphonia, 76
Gnaphalium, 46
Gomphidius, 53
Goniopteris reptans, 76; tetragona, 76
Greene, E. L., personal, 144
Grewiopsis, 35
Griffiths, D., personal, 31, 63, 94, 160
Grout, A. J., Additions to the recorded Flora of Long Island, 49
Gymnocladus dioica, 5
Gymnogongrus, 149

Haastia, 46
Halictus anomalus, 43; pruinosus, 43
Halsted, B. D., The "Tendrils" of the Kentucky Coffee-Tree, 5; On the Behavior of Mutilated Seedlings, 17; personal, 128
Hamamelis, 21
Harper, R. M., Ilex myrtifolia with yellow Fruit, 43; A Visit to Okefinokee Swamp in Southern Georgia, 156; personal, 62
Havard, V., personal, 40

Hays, W. M., personal, 176
Hazen, T. E., The Habitat of the slender Cliffbrake, 176; personal, 144, 190
Hedysarum Americanum, 47
Helianthus, from Florida, A seabeach, 74; annuus, 19; carnosus, 74; heterophyllus, 75
Hemieva, 125
Hemizonia from California, A new, 122; grandifolia, 122; luzulaefolia, 122
Herbarium Specimens in Classes, Handling, 38
Heuchera, 125
Hillia, 12
Hitchcock, A. S., personal, 144
Hollick, A., Fossil Ferns from the Laramie Group of Colorado, 145; Flora of Provincetown, 58
Holm, T., personal, 48
Holodiscus discolor, 130, 131
Hopkins Seaside Laboratory, 94
Horticultural Society of New York, 95
House, H. D., The acaulescent Violets of Central New York, 68; personal, 190
Houstonia coerulea, 106; longifolia, 106
Howe, C. D., Some Notes on the Dwarf Mistletoe, 8
Howe, M. A., A note on the Vitality of the Spores of Marsilea, 120; Caloglossa Leprieurii in Mountain Streams, 149; Note on the Report of the Brown-Harvard Expedition to Nachvak, Labrador, 175; personal, 190
Hydrangea, 125
Hydrophyllum, An undescribed Species of, 123; patens, 123; Virginianum, 123
Hygrocybe, 73
Hygrophoreae, A Key to the North American Genera and Species of the, 53, 73
Hygrophorus, 2, 53; Key to the Species, 73
Hypericum prolificum, 52
Hypochaeris radicata, 45, 52
Hypholoma, A Key to the North American Species of, 22
Hypnum admistum, 50, 91
cordifolium, 50
crista-castrensis, 50
fluitans Atlanticum, 47
micans, 91
molluscum, 50
Patientiae, 50

Ilex aquifolium, 44; myrtifolia, 43; myrtifolia with Yellow Fruit, 43; opaca, 43; verticillata, 44
Index to Botanical Literature, A new, 184
Ipomoea purpurea, 17
Isotria affinis, A new Station for, 143
Itea, 125

Key to the North American Species of Cortinarius, A, 169, 180
Key to the North American Genera and Species of the Hygrophoreae, A, 53, 73
Key to the North American Species of Hypholoma, A, 22
Key to the North American Species of Lactarius, A, 139, 152
Key to the North American Species of Russula, A, 101, 117
Keys to the North American Species of the Coprineae, 37
Knowlton, F. H., personal, 191

Labrador, Note on the Report of the Brown-Harvard Expedition to Nachvak, 175
Lady's-Slippers, Our yellow, 84
Lactarius, 2, 187; A Key to the North American Species of, 139, 152
Lactuca sagittifolia, 53; scariola, 174
Laminaria longicruris, 76; platymeris, 76
Lamson-Scribner, F., personal, 13
Laramie Group of Colorado, Fossil Ferns from the, 145
Lawson, A. A., 94
Leaves, Mutual Irregularities in Opposite, 137
Lechea villosa, 52
Lectures, Botanical Garden, 64
Lentinus, 2
Lenzitis betulina, 88; sepiaria, 88
Leontodon nudicaule, 53
Leptilon, 11
Leptodon, 188
Leucampyx Newberryi, 42
Limacium, 53, 54
Limpricht, K. G., death of, 191
Liriodendron Leaves, Additional Notes on, 33; giganteum, 36; Meekii, 36; primaevum, 36; semialatum, 35; Tulipifera, 34–36
Liriodendropsis angustifolia, 36; simplex, 36
Lithophragma, 125
Lloyd, F. E., An interesting Irregularity in a Rose Flower, 90; Handling Herbarium Specimens in Classes, 38; Mutual Irregularities in opposite Leaves, 137; Observations on Lycopodium, 20; Vivipary in Podocarpus, 113; Vacation Observations, 173, 177; personal, 94
Local Flora, Notes on, 103
Long Island, Additions to the recorded Flora of, 49
Long Island Moss, Notes on a, 91

Lonicera, 137; Xylosteum, 152
Lotus corniculatus, 52
Lunularia cruciata "in Fruit," 124
Lupinus argophyllus, 42; decumbens argophyllus, 42; Helleri, 42; perennis, 104
Lychnis Coronaria, 51
Lycopodium, Observations on, 20; alpinum, 20; complanatum, 20; lucidulum, 51, 177; porophilum, 21; Selago, 21, 177; tristachyum, 20
Lyon, H. L., personal, 63, 144

MacDougal's "Elementary Plant Physiology," 56
MacDougal, D. T., The Origin of Species by Mutation, 65, 81, 97; personal, 14, 62
Macfarlane, J. M., personal, 79
Macloskie, G., 144
MacMillan, C., personal, 48
MacRae, L. G., personal, 95
Magnolia Virginiana, 104
Marasmius, 2
Marcgravia, 12
Marsilea, A Note on the Vitality of the Spores of, 120; Aegyptiaca, 120; quadrifolia, 120; vestita, 121
Martynia, 93
Melastoma, 12
Melocalamus, 116
Melocanna bambusoides, 116
Merrill, E. D., personal, 48, 160
Micrampelis Oregana, 132
Microsphaera grossulariae, 49; quercina, 49
Mistletoe, Some Notes on the Dwarf, 8
Monotropsis odorata, 93
Moore, A. C., 95
Moore, G. T., 63, 95
Morris, D., 176
Mouriria from Porto Rico, A new, 10; Domingensis, 10; **Helleri**, 10; spathulata, 10
Mnium punctatum elatum, 50; rostratum, 50
Munson, T. V., personal, 176
Murrill, W. A., Animal Mycophagists, 25; personal, 126
Mutation, The Origin of Species by, 65, 81, 97
Mutual Irregularities in opposite Leaves, 137
Mushrooms, The Field Study of, 2
Mycological Clubs, Conservation of Energy in, 1
Mycophagists, Animal, 25

Nabalus Bootii, 47
Nash, G. V., personal, 79, 112
Nelumbo, 63
New Jersey, A new Violet from, 24
New Mexico Plants, Some, 154
New York, The acaulescent Violets of Central, 68
Nicholson, G., personal, 176
Nitella, 125
Nyctalis, 53, 54

Ochlandra, 116
Oenothera albida, 82; brevistylis, 82; elliptica, 82, 85; gigas, 82; laevifolia, 81, 82; Lamarckiana, 81, 82, 100; lata, 82, 83; leptocarpa, 82; nanella, 82; oblonga, 82; rubrinervis, 82; scintillans, 82, 83; sublinearis, 83
Okefinokee Swamp, in Southern Georgia, A visit to, 156
Onagra biennis, 81, 82, 100; brevistylis, 100; gigas, 100; lata, 100; nanella, 100; rubrinervis, 100
Onoclea, 179; sensibilis, 178
Oregon, The Vegetation of Northwestern, 129
Origin of Species by Mutation, The, 65, 81, 97
Orontium aquaticum, 103

Pachyma Cocos, 59
Palmer, E., personal, 31
Palmer, W., personal, 31
Panicum maximum, 12
Papaver dubium, 52
Parinarium, 7
Parish, L. B., Notes on two Parasitic Plants, 105
Parnassia, 125
Parosela Jamesii, 156
Parthenocissus tricuspidata, 138
Passalora bacilligera, 159; **fasciculata**, 160; **Helleri**, 160
Peck, C. H., personal, 144
Pecopteris sepulta, 147
Pedicularis lanceolata, 52
Peirce, G. J., Extrusion of the Gametes in Fucus, 134
Pellea gracilis, 47, 176
Peperomia from the Island of St. Kitts, A new, 43; **Davisii**, 43; inophylla, 43
Peritoma serrulatum albiflorum, 42
Persea gratissima, 12
Petiolate Connation in Trifolium pratense, 183
Petunia parviflora, 52
Phaseolus, 137
Philadelphus, 125; Californicus, 130
Philodendron, 12
Phoradendron flavescens macrophyllum, 105; Bolleanum, 106; Californicum, 106; juniperinum, 106

Phryma leptostachya, 52
Phyllactinia suffulta, 49
Phyllites obcordatus, 36
Phyllospadix, 63
Physa humosa, 72
Physalis heterophylla, 52
Phytolacca decandra, The Pith Cells of, 141
Picea alba, 26; Sitchensis, 133
Picris hieracioides, 53
Pinchot, G., personal, 79
Pinguicula vulgaris, 47
Pinus, 72; contorta, 133; echinata, 190; rigida, 59; Strobus, 190
Piricularia euphorbiae, 160
Plagiothecium denticulatum, 50; Ruthei, 50; striatellum, 50; sylvaticum, 50
Plant Preservation, Prize Essays, 64
Plant Protection Fund, Prizes, 14
Plantago aristata, 52; media, 52
Plantanus, 35
Plants, Notes on two parasitic, 105; Notes on Southwestern, 42
Pleuridium subulatum, 50
Podocarpus, 12; Vivipary in, 113; Makoyi, 113
Pogonia affinis, 143; verticillata, 143
Poinceana, 58
Polemonium delicatum, 156
Pollard, C. L., A New Violet from New Jersey, 24; personal, 31, 96
Polypodium polypodioides, 157; vivipariim, 47
Polyporus applanatus, 89; arcularius, 89; betulinus, 88; brumalis, 90; elegans, 89; flavo-virens, 25; fomentarius, 89; frondosus, 89; hirsutus, 89; igniarius, 89; leucophaeus, 89; lucidus, 88; pergamenus, 88; picipes, 89; rimosus, 88; splendens, 90; sulphureus, 89; versicolor, 88
Polystichum Braunii, 47; **Hillsianum,** 146
Polytrichum formosum pallidisetum, 27; Ohioense, 27; pallidisetum, 27
Pontederia, 157
Porotrichum Alleghaniense, 188
Porphyra, 76
Porto Rico, A new Mouriria from, 10
Potamogeton crispus, 51
Potentilla arguta, 52; intermedia, 52; subviscosa, 155
Pound, R., personal, 63
Prescott, S. C., personal, 112
Pringle, C. G., personal, 94
Proceedings of the Club, 10, 26, 45, 58, 76, 92, 111, 125, 186
Prunus emarginata, 30
Pseudotsuga mucronata, 129
Psilotum, 11
Pteridium aquilinum, 132
Pylaisia Schimperi, 51
Pyrola minor, 47

Queen Charlotte Islands, A Saxifrage from the, and its Relatives, 55
Quercus alba, 49; coccinea, 117; fusiformis, 117; Garryana, 130; palustris, 117; prinoides, 51; rubra, 117; velutina, 117

Railroad Ties, A new Timber for, 6
Ranunculus delphinifolius, 104; hispidus, 51; micropetalus, 156; obtusiusculus, 104; pusillus, 104; scleratus, 104; septentrionalis, 51
Raoulia, 46
Raphidostegium **admistum,** 50, 91; Jamesii, 44; recurvans, 51
Razoumofskya pusilla, 8, 9
Reviews: Campbell's "University Text-Book of Botany," 108; Lloyd's "Comparative Embryology of the Rubiaceae," 106; MacDougal's "Elementary Plant Physiology," 56; Royal Society's "International Catalogue of Scientific Literature," 184; de Vries' "Die Mutationstheorie," 65, 81, 97
Rhododendron, A Georgia, 9; Catawbiense, Field-notes on, 161; **Cuthbertii,** 9; maximum, 104, 161; punctatum, 9
Rhus radicans, 138
Ribes, 125
Richards, H. M., 92
Richardson, R. S., personal, 63
Richardsonia pilosa, 106, 108
Robinia, 88
Robinson, B. L., personal, 13, 32
Robinson, W. J., personal, 112
Rosa, 131
Rose Flower, An interesting Irregularity in a, 90
Rubia tinctoria, 106
Rubus, 32; Baileyanus, 52; hispidus, 59; nigrobaccus, 137; Nutkanus, 132; occidentalis, 137; setosus, 52; spectabilis, 132, 133
Rumex Patientiae, 51; persicarioides, 51
Rusby, H. H., A new Timber for Railroad Ties, 6
Russula, 2; A Key to the North American Species of, 101, 117
Rydberg, P. A., A new Station for Isotria affinis, 143; Is the white-fruited Strawberry of Pennsylvania a Native Species? 158; Our yellow Lady's-Slippers, 84; personal, 63

St. Kitts, A new Peperomia from the Island of, 43

Salicornia, 187
Salix, 72, 93; alba, 88; Uva-Ursi, 47
Salomonia commutata, 103
Sambucus Canadensis, 49
Sarracenia minor, 157
Sassafras, 35
Saxifraga Aizoön, 47; austromontana, 156; autumnalis, 47; ferruginea, 55; **Newcombei**, 55; oppositifolia, 47; rivularis, 48
Saxifrage from the Queen Charlotte Islands, and its Relatives, A, 55
Schrenk, H. von, 63
Scirpus cæspitosus, 51
Scleria, 12
Sclerolepis uniflora, 105
Scolecotrichum Euphorbiæ, 159, 160
Seedlings, On the Behavior of mutilated, 17
Selaginella, 11; **acanthonota**, 172; rupestris, 172; **Sherwoodii**, 172; tortipila, 172
Selaginella in the Southern Flora, Two new Species of, 172
Selby, A. D., personal, 190
Seligeria campylopoda, 27
Senecio obovatus, 53, 105
Seymour, A. B., personal, 112
Shafer, J. A., personal, 160
Sharon Biological Observatory, 112
Shaw, C. H., personal, 95
Sherardia arvensis, 106
Shinn, J. T., Lunularia cruciata "in Fruit," 124
Silene Caroliniana, 103
Slosson, M., 112
Small, J. K., A Georgia Rhododendron, 9; A Saxifrage from the Queen Charlotte Islands and its Relatives, 55; A Seabeach Helianthus from Florida, 74
Smith, A. M., personal, 62
Smith, E., work of, 127
Smith, J. G., personal, 63
Society for Plant Morphology and Physiology, 15
Solidago juncea, 52; Virgaurea, 47
Sphaerium magnum, 72
Spillman, W. J., personal, 13
Spiraea Douglasii, 130
Spores of Marsilea, A note on the Vitality of the, 120
Stachys, 187
Stenopteris **cretacea**, 148
Stone, W., Viola renifolia in the Pennsylvanian Alleghenies, 75
Strawberry, White-Fruited, of Pennsylvania, 158
Stypocaulon, 76
Symphoricarpos, 131
Syracuse Botanical Club, 60, 127
Syringa vulgaris, 137

Taraxacum Taraxacum, 43
Taxodium imbricarium, 157, 158
Taxus, 113; brevifolia, 130
Telesonix, 125
Tellima, 125
"Tendrils" of the Kentucky Coffee-Tree, The, 5
Thaumatopteris, 148
Therofon, 125
Thelia asprella, 50; Lescurii, 50
Thuya gigantea, 129
Tiarella, 125
Tillandsia Balbiviana, 117; usneoides, 15
Torrey Club, Proceedings of, 10, 26, 45, 58, 76, 92, 111, 125, 186
Tragopogon pratensis, 104; porrifolius, 104
Trametes suavolens, 84
Treub, personal, 191
Trifolium pratense, Petiolate Connation in, 183; pratense quinquefolium, 184
Trollius laxus, 104
True, R. H., personal, 95
Tsuga heterophylla, 132
Typha, 93

Underwood, L. M., Campbell's "University Text Book of Botany," 108; Conservation of energy in Mycological Clubs, 1; The Bracket Fungi, 87; Two new Species of Selaginella in the southern Flora, 172; A new Index to Botanical Literature, 184.
Utricularia, 13; clandestina, 104; inflata, 104; vulgaris, 104

Vacation Observations, 173, 177
Vaccinium, 132; caespitosum, 47; uliginosum, 47; Vitis-Idaea, 47
Valeriana officinalis, 104
Vegetation of Northwestern Oregon, The, 129
Verbena bipinnatifida, 124; bracteosa, 124; **brevibracteata**, 124; **racemosa**, 123; Wrightii, 124
Vermont Botanical Club, 13, 31
Viburnum ellipticum, 130; pauciflorum, 47
Viola, 12, 32; affinis, 70; alsophila, 71; amoena, 71; **Angellae**, 24, 59, 93; asarifolia, 68; Atlantica, 52; blanda amoena, 71; blanda renifolia, 71; blanda palustriformis, 71; Brittoniana, 24; communis, 70; cordifolia, 69; crenulata, 70; cucullata palmata, 68; cucullata, 70; falcata, 24; lanceolata,

71, 101; Le Conteana, 71; nodosa, 69; palmata, 24, 25; palmata cucullata, 70; palmata asarifolia, 68; palmata sororia, 68; obliqua, 70; odorata, 70; papilionacea, 70; primulaefolia, 104; renifolia, 71, 75; rostrata, 104; rotundifolia, 70, 104; Selkirkii, 70; sororia, 68, 69; viarum, 24; villosa, 69
Viola renifolia in the Pennsylvanian Alleghanies, 75
Violet from New Jersey, A new, 24
Violets of Central New York, The acaulescent, 68
Vittaria, 13, 46, 187; lineata, 29

Ward, L. F., personal, 191
Waugh, F. A., personal, 127
Webera sessilis, 180
Weiss, F. E., personal, 191
Went, F. A. F. C., personal, 48
White, C. A., Petiolate Connation in Trifolium pratense, 183
White, V. S., work of, 94
"Wild Flower Presentation Society of America," 96, 128
Williams, R. S., personal, 191
Willis, O. R., death of, 80
Willugbyaea scandens, 105
Wilson, P., personal, 126, 144
Woodsia alpina, 47, 176; glabella, 47, 176
Woodwardia Virginica, 157

Xanthium Canadense, 52

Zizia cordata, 52

OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

(1) BULLETIN

A monthly journal devoted to general botany. Vol. 28, published in 1901, contained 706 pages of text and 49 full page plates. Price $3.00 per annum. For Europe 14 shillings. Dulau & Co., 37 Soho Square, London, are agents for England.

Of former volumes, only 1–6 and 19–28 can be supplied entire from the stock in hand, but the completion of sets will be undertaken. Yearly volumes 1–5 (1870–1874), one dollar each. Vol. 6 (1875–1879), extending over five years, is furnished at the subscription price of five dollars. Vols. 19–27 (1882–1900) are furnished at the published price of two dollars each; Vol. 28, three dollars.

Single copies (30 cts.) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The MEMOIRS are published at irregular intervals. Volumes 1–11 are now completed and No. 1 of Vol. 12 has been issued. The subscription price is fixed at $3.00 per volume in advance. The numbers can also be purchased singly. A list of titles of the individual papers and of prices will be furnished on application.

(3) **The Preliminary Catalogue of Anthophyta and Pteridophyta** reported as growing within one hundred miles of New York, 1888. Price, $1.00.

Correspondence relating to the above publications should be addressed to

THE TORREY BOTANICAL CLUB
Columbia University
NEW YORK CITY